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WORLD PETROLEUM

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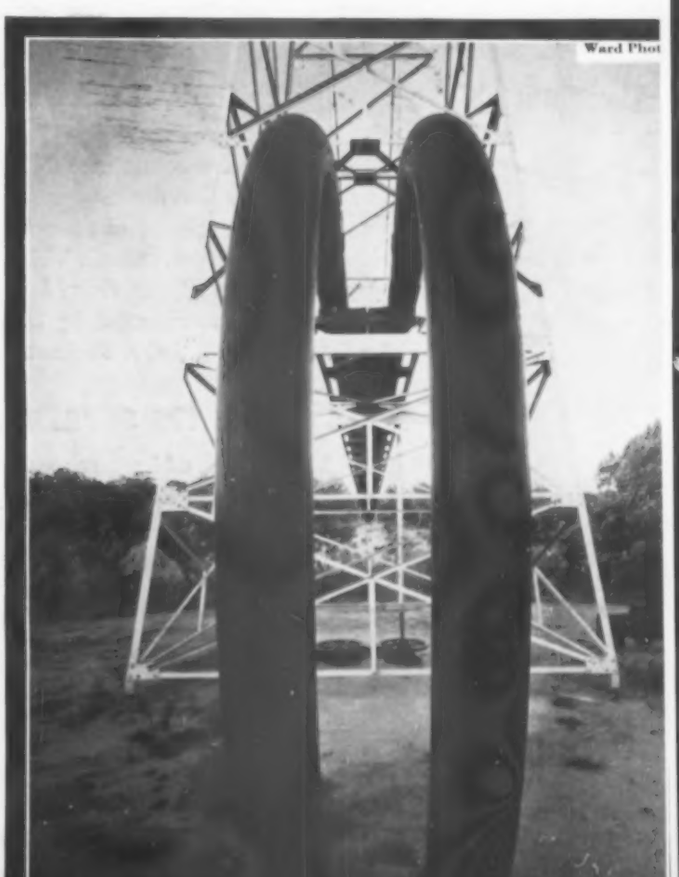
Estimated Reserves and Geology of Lucien, Oklahoma • Visible California Supplies Cannot Maintain Present Rate of Production for Long • La Mailleraye, Famous Producer of Specialities • British Price Policy • Another Pipeline for Persia



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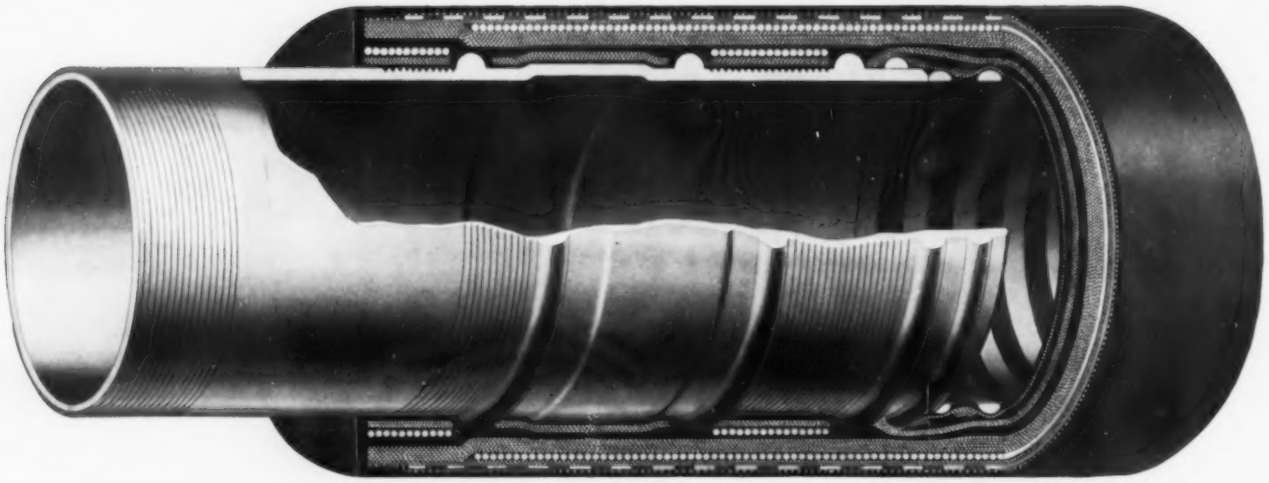

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1934

WORLD PETROLEUM

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Air view of Kettleman Hills, North Dome in California showing clearly the anticlinal fold

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Changing Conditions

FOR SOME time past there has been observable, particularly within the United States, a shifting of interest and emphasis from concentration on questions of refining and marketing back to the problem of crude production and reserves. While state and federal governments, and the industry itself, are still struggling to curb excessive output and the consequent demoralization of markets, it requires no deep study to realize that though no immediate deficit of supply is threatened a shortage of new flush production is impending. As realization of this fact has spread through the industry there has been a rush to acquire reserves, a movement that has been particularly marked during the past year and that still continues. Fresh impetus has been given to geophysical research, to scientific methods of exploration and to the possibilities of deep drilling as a means of locating fresh supplies.

A shortage of new flush production in the United States has implications so broad that the subject merits the closest study. The gradual subsidence of flowing fields will mean that dollar crude will no longer be available. Will it appear then that the United States has embarked on a mistaken policy in rearing a tariff wall to exclude available supplies from outside the country while the valuable reserves within were being wastefully used? Will it be necessary to revise this policy if oil is not to be displaced in many of its hard-won markets, evidences of which already are beginning to appear? These and other questions of importance to the public as well as to the petroleum industry are likely to press for answers in the future.

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World Reflex

THE VAST importance to the world industry of the approaching change in conditions within the United States may be readily appreciated when one considers that lack of flush production with consequent higher prices will mean a change in the flow of oil in international commerce, renewed activity in exploration outside of as well as within the United States, limitations on the use of fuel oil, abandonment of old wildcatting methods, greater reliance upon scientific research in exploration, and finally the evolution of new ideas for the conservation of a more expensive motor fuel.

One result of this changing situation becomes increasingly clear. Only those units within the industry that can afford the increasingly expensive methods of research and exploration that are necessary today to uncover new reserves will be in a position to control the sources of future supply and, hence, to a large extent, the industry itself. Decreasing importance will be the portion of those units organized primarily for marketing and without adequate reserves of crude.

Appreciation of the importance of this situation has led WORLD PETROLEUM to undertake an extensive study of principal and typical fields in order to be able to report on the exact condition of reserves and the economic prospects of these various areas. The subject will be treated in a series of articles the first of which appears in this issue and describes the Lucien field in Oklahoma. These articles will deal, not only with reserves in the fields and the geology on which the conclusions are based, but also with the history and development of each important pool described, the companies that are interested in it and its economic significance. Much of the information contained in these articles has never before been available generally and we believe that these authoritative reviews will be of very definite value and interest.

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Code's Sole Achievement

AT THE end of a year during which the petroleum industry of the United States has operated under a code adopted in conformity with the provisions of the National Industrial Recovery Act the federal organization set up to administer the code, together with its multitudinous advisory, supplementary, subordinate, local and regional committees, has just one definite achievement to which it can point with pride. The price of crude oil has been raised to a basic level of a dollar a barrel and has been kept there throughout the year.

As a matter of fact the virtual doubling of the price of crude was brought about by common agreement among the members of the oil industry and in conformity with the wishes of the oil Administration before the date set for the inauguration of code control. The action was taken in the first flush of enthusiasm over the new deal for petroleum and in the belief that the increase in the cost of crude would soon be reflected in higher prices for products along with the abolition of excessive production, price cutting and other wasteful and uneconomic practices from which the industry had suffered. In reality not one of these abuses had been eradicated after twelve months of unremitting effort. The Oil Administration has issued monthly quotas of allowable production yet in every month but one these have been sub-

stantially exceeded by the statistically recognized output while hot oil or unauthorized production has become a byword, amounting to as much as 100,000 bbl. daily in East Texas alone.

Although wages were increased and working hours lessened the industry was assailed by labor troubles as never before. Price wars have been as widespread and as virulent as at any time since oil became a commercial commodity. Retail prices of motor fuel and other products nowhere advanced in proportion to the rise in crude and companies depending upon refining and marketing have been compelled to operate at a loss. From the viewpoint of all except crude producers and law-evading operators the record of the first year under the petroleum code was far from a glittering success.

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Washington's New Effort

IN VIEW of this past experience it is not surprising that the announcement from Washington in late September of a proposed reorganization of the federal administrative machinery, of a closer coordination of effort among the departments and bodies dealing with petroleum, and of a vigorous drive to enforce laws that had remained more or less dead letters, failed to arouse great enthusiasm among long suffering members of the oil industry. As announcement has been made of successive steps designed to give effect to the reorganization program, however, it has been recognized by those familiar with past conditions in Washington and in the field that the proposals put forward offered promise of overcoming some of the serious shortcomings in past efforts to apply the provisions of the code.

Division of authority, overlapping of functions and failure to obtain general agreement upon the course to be followed in enforcing regulations have been responsible to a great degree for the failure in efficient application of the regulatory measures put forth. Oil Administrator Ickes has labored zealously to fulfill the duties of his position, but no man burdened as he is with more than sixty separate tasks, including some of the most important in the government's recovery program, could devote the time and attention necessary to establish a completely new method of operation in an industry composed of such diverse elements as is the petroleum trade. To meet this situation, an able and energetic oil man, Ralph Horween, has been appointed to be the secretary's executive arm and *alter ego* in the administration of oil affairs.

Differing views of the Department of Justice and the Oil Administration as to the preparation and presentation of cases against code violators have hampered legal action in support of the enforcement program. Now a special assistant to the Attorney General, L. R. Martineau, Jr., has been designated with authority to initiate and direct prosecutions. The Planning and Coordination Committee whose advice and suggestions have been largely disregarded by the federal authorities is to have a more potent voice in the shaping of plans and policies. The Petroleum Administrative Board, central cog in the administration of the code, probably will be reorganized or replaced by a committee with broad and well defined functions. Agreement is being sought on a measure to be put before Congress at the next session providing for a workable control of crude production.

All these appear to be steps in the right direction but results will depend upon the smoothness and vigor with which the new machinery actually operates. Certain it is that until excessive crude production has been stopped all other measures of stabilization will be in vain. The vast majority of the oil industry, however, will continue as in the past to cooperate loyally with the central organization in the hope that efficient means of controlling the essential and fundamental factors in the situation may be devised.

Uncertainty in Argentina

FOR TWO years the blight of political controversy has lain athwart the petroleum industry of Argentina. Socialistic members of the Argentine Congress have waged a campaign for the establishment of a government oil monopoly. Another strong political group, while unwilling to go this length, has urged the adoption of a measure that would give the government virtually complete control of the industry.

A bill sponsored by the less radical of these two elements, brought before the Congress at its recent session, was passed by the lower house but failed to receive action from the Senate. It would have imposed upon companies engaged in oil field development such onerous restrictions and taxes as would have prevented exploration by private interests. Perhaps with this possibility in view it authorized the creation of mixed companies in which the federal or provincial governments would hold joint interests with private capital. It would have exacted heavy royalties, not only from new enterprises but also from companies long established within the country. It conveyed authority to the federal government to limit or prohibit imports in the event of emergency or "in the interest of the public."

Under the terms of a law such as this the position of private companies in Argentina would have been so precarious as to prevent any expansion of activities, yet the bill was too conservative to suit the extreme element in Congress who will be satisfied with nothing less than a full-fledged government monopoly.

Unless the bill is acted upon by Congress at the session which begins in November it cannot be further considered in its present form and the likelihood of such action appears to be slight. Meanwhile development work in Argentina has been suspended, except for some small activities of the YPF, the government controlled company, by the withdrawal of all promising areas as national reserves. Removal of these restrictions and adoption of a policy of encouragement to private initiative undoubtedly would be followed by rapid development in Argentina.

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Soviet Needs

SOVIET economists claim, and with apparent justification, that theirs is the only country in which economic planning is possible. Even with a wealth of plans, however, the execution of their projects seems to encounter serious difficulties. During the period of the first Five Year Plan 1,500,000,000 rubles were invested in the industry and the modernization of drilling and refining methods and equipment was attempted.

It was expected that the liberal expenditures made during this period would bridge the way to national self-sufficiency for the oil industry, that drilling technique would be raised to a high standard and that domestic machine shops and manufacturing plants would be in a position to supply future needs in the way of refinery construction and equipment.

In no single respect have these expectations been realized. While many new discoveries have been reported it is evident that prospecting and development have not been sufficient to assure a steady maintenance of production in pace with the growth of interior demands. The combined resources of machine industry and engineering experience have not been able to provide adequate refining capacity. In order to maintain productive capacity and to realize the high standards of quality that are demanded today resort again must be had to importations. If suitable credit arrangements can be established with manufacturing countries, preferably the United States, the Soviet Union probably will make large purchases of equipment, particularly up-to-date refining units. Otherwise it is difficult to see how the U. S. S. R. can maintain its present position in international markets, to say nothing of increasing its share in the total volume of world exports.

General view of La Mailleraye storage tanks.

La Mailleraye—Famous Producer of Specialties

Its Refinery, Located on the Seine, Originally Limited its Output to Pharmaceutical Oils, Now Manufactures Lubricants, Diesel Oils and Asphalt Products.—Has Large Export Trade.

ONE of the interesting and unusual refining establishments in France is La Mailleraye, located at La Mailleraye-sur-Seine, between the towns of Caudebec and Duclair. It was established originally in 1915 for the purpose of refining pharmaceutical oils and thereby created a new industry for France which previously had been dependent on importations for oils of this class.

The original plant was a small one but it has grown by successive additions as the demand for its products increased and new products were added until now it occupies a tract of 185 acres, fronting on the Seine, with deep water available for shipping and extensive railway sidings for land transportation.

While at first confining its efforts mainly to the service of the pharmaceutical, perfumery, baking and similar industries, La Mailleraye presently added to its list of products transformer and switch oils which shortly attained a high reputation in the electrical trade. As a subsequent natural step it entered the lubricating oil market. Through its connection with the Atlantic Refining Company rapid strides were made in this field. Today the company ranks second among the French refiners in the distribution of lubricating oils.

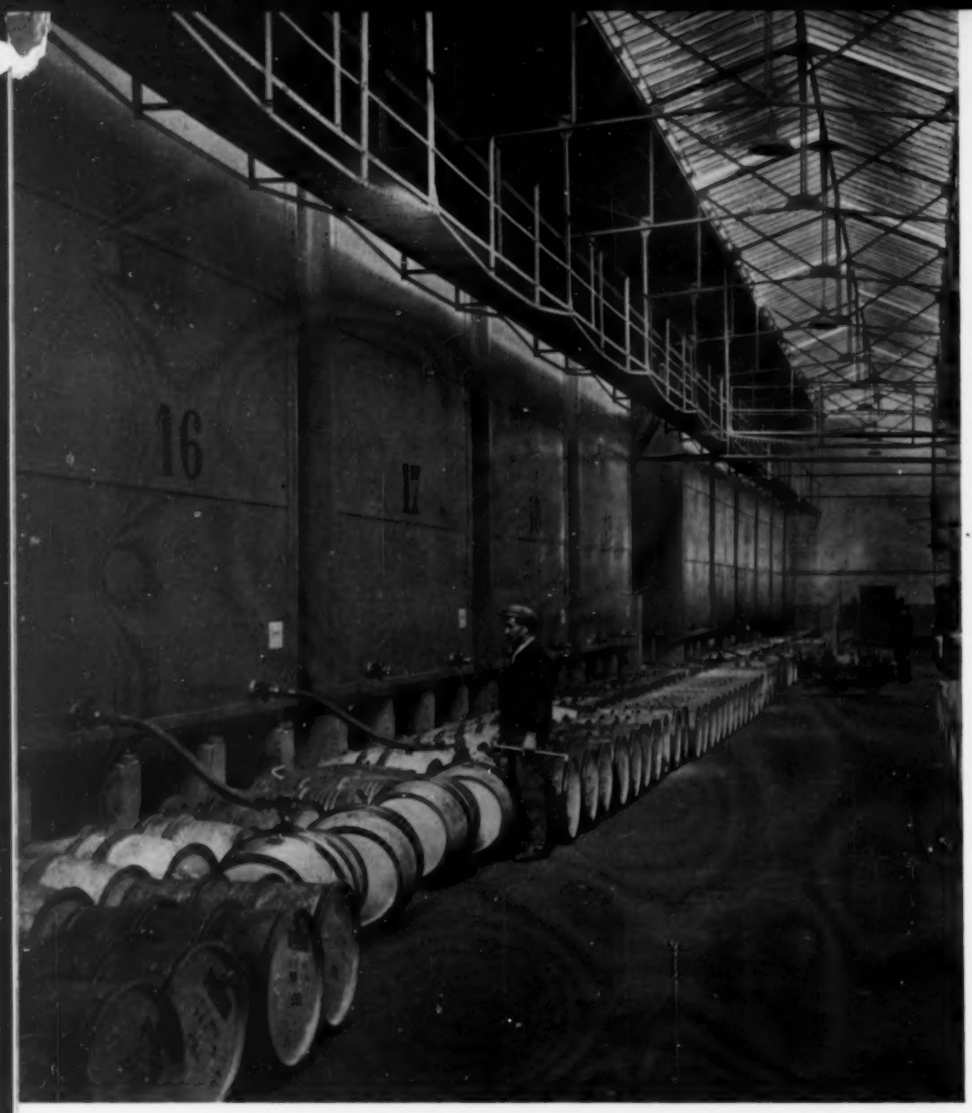
Other products were gradually developed such as turbine oils, Diesel engine oils, compressor oils, cable insulating oils, lubricating greases, roller mill greases and various others. In 1926 La Mailleraye undertook the manufacture of asphalt road emulsions. More recently it has added a full line of asphalt specialties including asphalt paints, putties and waterproof emulsions. At the present time it has fifteen emulsion plants located at various points in France and North Africa. A short time ago the company took over rights for the manufacture and distribution in France and the French colonies of Volck insecticides by arrangement with the California Spray Chemical Corporation.

View of La Mailleraye refinery taken from the River Seine.

La Mailleraye Outturn of Principal Products

Annual Production	Metric Tons
Specialty products	20,000
Lubricating oils	27,000
Asphalt emulsion and specialties	55,000
Movement of distillates and finished products:	
By water	67,000
By rail	75,000

Through the excellence of its products La Mailleraye has developed within recent years an extensive export demand for its



Drawing white and transformer oils from inside storage tanks at La Mailleraye.

output, particularly in medicinal, white technical and transformer oils, which find a sale in practically every country of the world. In consequence of the steady increase in capacity and in the demand for its specialized products the company now has the largest specialty plant in France and one of the largest in the world.

The process used in refining transformer and white oils is one developed by the company's own technical staff. La Mailleraye maintains a large and well equipped laboratory which is devoted to investigations for the improvement of its methods and products and to solving the special problems of its customers.

Unloading facilities at the refinery consist of a dock 80 metres in length from which incoming oils are pumped to the storage tanks through four separate lines of 10-inch diameter, permitting an average pumping rate of 400 tons per hour.

Distillates, carefully selected for each specific usage, are imported in ocean-going tankers of 7,000 to 8,000 tons capacity and are stored in the shore tanks of which there are 24 with a combined capacity of 33,000 tons. The distillates when withdrawn from the tanks undergo a four-stage treatment which includes acid treating, neutralization, washing and clay filtering.

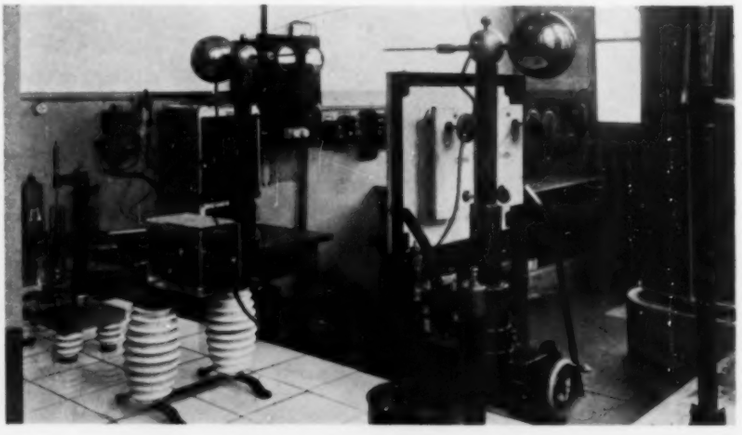
The acid treating of pharmaceutical, white technical and transformer oils is conducted by the batch method with air blowing and time settling of the sludge. The treating equipment consists of 15 cylindrical agitators with an average capacity of 40 tons each. The agitators are lined with acid-resisting tile with conical base and draw-off valve for sludge and gas pipe for evacuation of acid fumes to a central stack. The agitators are set up at an elevation of 15 metres on steel girders, permitting the acid oil to flow by gravity into tile-lined wash tanks of equal capacity located directly below the agitators.

The acid sludge is dropped by gravity into the sludge kettles where spent acid is retrieved, the sludge going to the boiler house where it is used as fuel. Acids of varying concentrations are used, ranging from 66 deg. Beaumé to fuming acid, depending on the nature of the distillate and the finished quality to be obtained. The number of treatments range from one or two for transformer oils to seven for water white oils.

The sour oil is neutralized with soda solution, the soaps drawn off and the neutral oil is then thoroughly washed with water. The alkaline soaps are reprocessed for the recovery of any oil carried over and the purified soaps serve as a valuable base for the manufacture of soluble oils and analogous products.

The treated and washed oils are then conveyed by gravity to the filter house. Filtration is conducted by the contact method with high efficiency fine-mesh clay by successive filtrations until the desired color is obtained. This filtering equipment consists of 12 cylindrical mixers and 20 presses, including Sweetland

Electrical apparatus for the control of the dielectric strength in insulating oil produced by La Mailleraye.

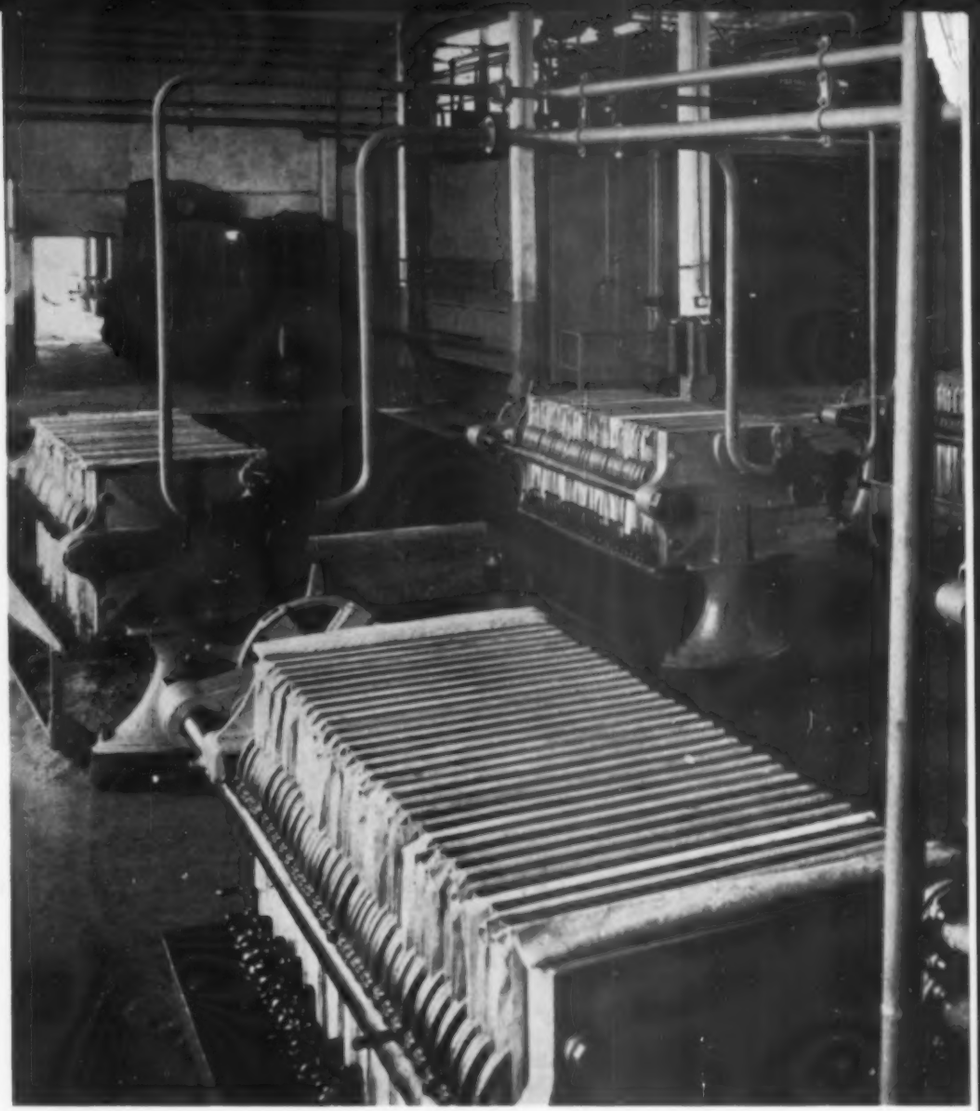


filters of the most improved type. The finished oils are then submitted to rigorous testing before being pumped to storage. Exacting control of the finished products is also exercised before shipment by approved methods of oxidation, dielectric strength, power factor and resistivity.

The power plant of the refinery comprises a multi-tubular Babcock & Wilcox boiler, two semi-tubular boilers and two small auxiliary boilers, giving a total of 1110 HP for the supply of steam for processing. Electric current is supplied from a nearby power station. There are three compressor units. One is an Ingersoll-Rand horizontal compressor and two are vertical Cerpelli compressors.

Aside from the refining equipment there is a modern grease plant for the manufacture of all types of lubricating, rolling mill and fibrous greases; a complete reconditioning plant for wood and steel barrels; a plant for the preparation of fuller's earth extracted from the company's own deposits; small treating units for the control of refinery operations, and a fully equipped machine shop for repairs and maintenance. There are also two filling buildings with tanks having a capacity of 6,000 tons for the filling of containers with specialty oils and lubricating oils. The company maintains a laboratory completely equipped for the conduct of analytical and research work including standard analytical apparatus and special electrical apparatus for the testing of lubricating oils by practically every known method.

Protection from fire is provided by a fire-fighting system which includes a river pump house with two Rateau centrifugal pumps, each discharging 100 tons of water per hour under six kilos pressure through an underground fire line to seventeen hydrants. There are two mobile Guinard volumetric pumps each of 40 tons per hour capacity, and a mobile Phillips & Pain foam apparatus capable of foaming 150 cubic meters per hour with distribution to the storage tanks.



View of filter presses used in contact filtration of white and transformer oil at La Mailleraye.

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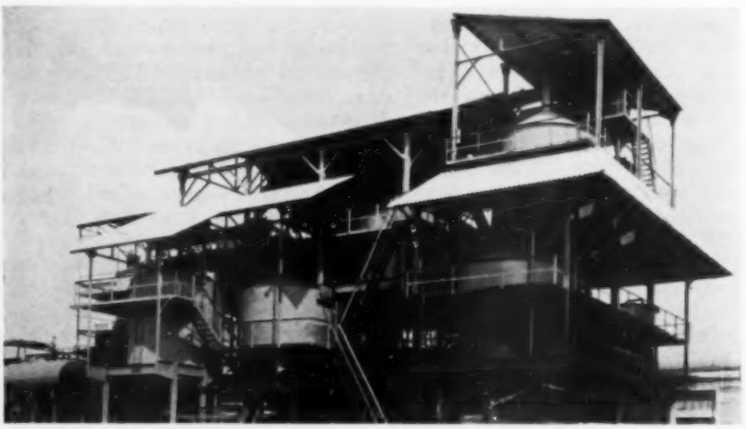


Complete treating unit for white and transformer oils produced at La Mailleraye.

The personnel of the company numbers 650, with 325 office employes and workmen at the plant. An attractively laid out village of over 100 dwellings and two large dormitories provides housing for the majority of the employes close to the refining plant. Social welfare facilities and conveniences include a cooperative store, plant restaurant, a cinema and a mutual aid society.

The Society of La Mailleraye holds an important participation in the Standard Franco-Americaine de Raffinage which recently completed a large crude oil refinery at Port Jerome not far from La Mailleraye. Through its proximity to this plant La Mailleraye is assured of an adequate supply of distillates, formerly imported, for the manufacture of its specialty products. The technical staffs of the two establishments coordinate their activities, La Mailleraye confining its activities as in the past to the production of high grade specialties.

Air view of the south end of the Lucien field in Oklahoma showing Shell Petroleum Company's No. 2 W. Kolb, Section 28, in right foreground.

Geology and Economic Significance of the Lucien Field

Reserves, Drilling Methods and Well Records of One of the Few Successfully Unitized Fields in the United States. First of a Series of Articles on Production and Reserves. By Basil B. Zavoico

THE PETROLEUM resources of the United States and the methods by which they have been developed require more careful study today than at any time in the last decade. It appears likely that much of the present flush production in the United States may be exhausted in the near future, that the government's strong efforts to maintain the price of crude at a mere dollar a barrel will seem fantastic—and that this condition will prevail surprisingly soon if a more orderly program of exploitation is not put into general practice in newly discovered fields. In the accompanying article, the first of a series on United States fields, WORLD PETROLEUM has been fortunate in being able to assemble in concise but detailed form the full history of the Lucien field, including geologic information not hitherto generally available.

THE LUCIEN field, located in Noble County, Oklahoma, (T. 20 N., R. 2 W.) was discovered in September of 1932 and has since become one of the more important oil pools in the Mid-Continent. While not in the class of exceptionally large fields, like East Texas, Van or Oklahoma City, the Lucien is a very valuable addition to Oklahoma's crude oil reserves. The discovery of the Lucien field is credited to surface detail mapping and to core drilling, both done by the Shell Petroleum Corporation. The outstanding features of the development of the Lucien field are its unitized block of 2,160 acres owned by eight companies and full cooperation of all outside operators with the policies of the management of the unitized acreage. The Lucien field is therefore the first important Oklahoma oil pool to have been successfully unitized.

A favorable surface structural feature in T. 20 N., R. 2 W. has been known to exist probably since 1915. The exposed geologic section is the Lucien shale member of Garber Sandstone, Permian, consisting of red clay shales, several ledges of red sandstone and also of lenticular red sandstone. The surface structure mapped on red sandstones shows a large flat area in sections 4, 5, 8, 9, 16, 17, 20 and 21 with a very sharp west dip in sections 7, 18 and 19, thus suggesting that this flat terrace overlies a closed structure of some extent on lower formations. Topography of the area very generally conforms to the indicated surface structure, forming an ascending terrace in sections 8, 9, 16, 17, 20 and 21, and breaking sharply to the west in sections 7, 18 and 19. The Roxana Petroleum Corporation (Shell) explored the area as early as 1917–1919, drilling to 3,508 ft. in section 9 without encountering any encouraging shows of oil or gas. Subsequently Shell Petroleum Corporation re-worked the surface geology in 1924 and core-drilled the western half of the township in 1928 checking to the Herington limestone of Stillwater formation, Permian, and was reported to have found a structure with small closure and very sharp west dip, thus substantiating the results of surface work.

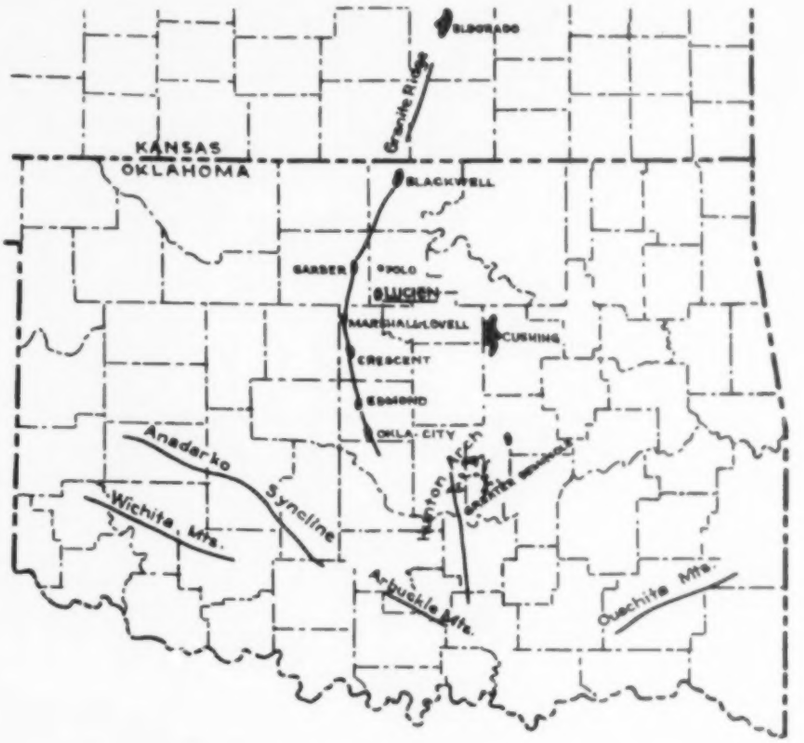
Shell Petroleum Corporation originally owned most of the acreage in the Lucien area, but later surrendered some of it, and by 1932 several other oil companies secured well located leases. In the spring of 1932, 2,160 acres on the north end of the Lucien structure were unitized into a community block, and the discovery well was drilled by L. H. Wentz and others in section 17 on the Wolff farm, being completed on September 28, 1932, for 1,817 bbl. of 41.8 gravity crude oil per day initially from the Simpson sand section of Ordovician age with total depth of 5,197 ft. After completion of the discovery well the operation of the unitized block, Lucien Consolidated, passed to the largest participant company, the Shell Petroleum Corporation.

Development

LUCIEN field is the first important oil pool in Oklahoma to have been successfully unitized and operated. Even though the original unitized block covers less than half of the field, as finally proven, the operators of the acreage outside of the unitized section fully cooperated with the management of the block in conservative development. Prior to drilling of the discovery well, L. H. Wentz et al. No. 1 Wolff in section 17, 2,160 acres on the north end of the present field were unitized by their owners; Shell Petroleum Corporation controlling 34.27 percent, or the largest share of the unitized block became the operating company under the name of Lucien Consolidated. It was decided to develop the unitized block very conservatively, drilling but one well on each 40 acres. Companies with acreage surrounding the block agreed to the plan, even though some difficulties were experienced at first. Subsequent development proved for production 920 acres located within the unitized block and 1,200 acres outside of it. The most prolific acreage proved to be outside of the block and owned by the Carter Oil Company (S.O.N.J.). A total of 53 oil wells was drilled in the Lucien field to the Simpson sand, of which 2 were non-commercial wells, Lucien Consolidated Nos. 2 and 3 Wolff, and some 10 were very small producers. One well on the east side of the field, after testing Simpson dry, was plugged up and completed for an Oswego limestone well, Stanolind Oil and Gas Company's et al. No. 1 J. Bolay in section 16, while 5 failures were drilled, both east and west from the producing area. The accompanying tables give in detail all initial productions and total recoveries per well to date, together with the estimated reserves of the field. The fact that present development is limited to one well to each 40 acres, and the possibility that in the future closer spacing will be adopted in parts of the field makes the calculations difficult and therefore the estimates given consider both possibilities. The economic comparison of 40 versus 10 acres to a producing well in Lucien will be given under cost estimates. In calculating the reserves, the Lucien field was divided in five classes of forty-acre tracts and reserves were figured on the basis of initial production, total recoveries to date, drop in bottom-hole pressures, gas volume and the experience with similar Simpson production in other fields. On tracts with large wells and consequently greater porosity and drainage area additional drilling obviously will not increase the cumulative recoveries in proportion as much as additional wells on tracts with small producers due to tight sand conditions and consequent small drainage area. By the end of September, 1934 the Lucien field was fully developed and only one well was drilling, Lucien Consolidated No. 1 R. Hay in Section 17.

Estimated per Acre Cumulative Recovery in Lucien Field

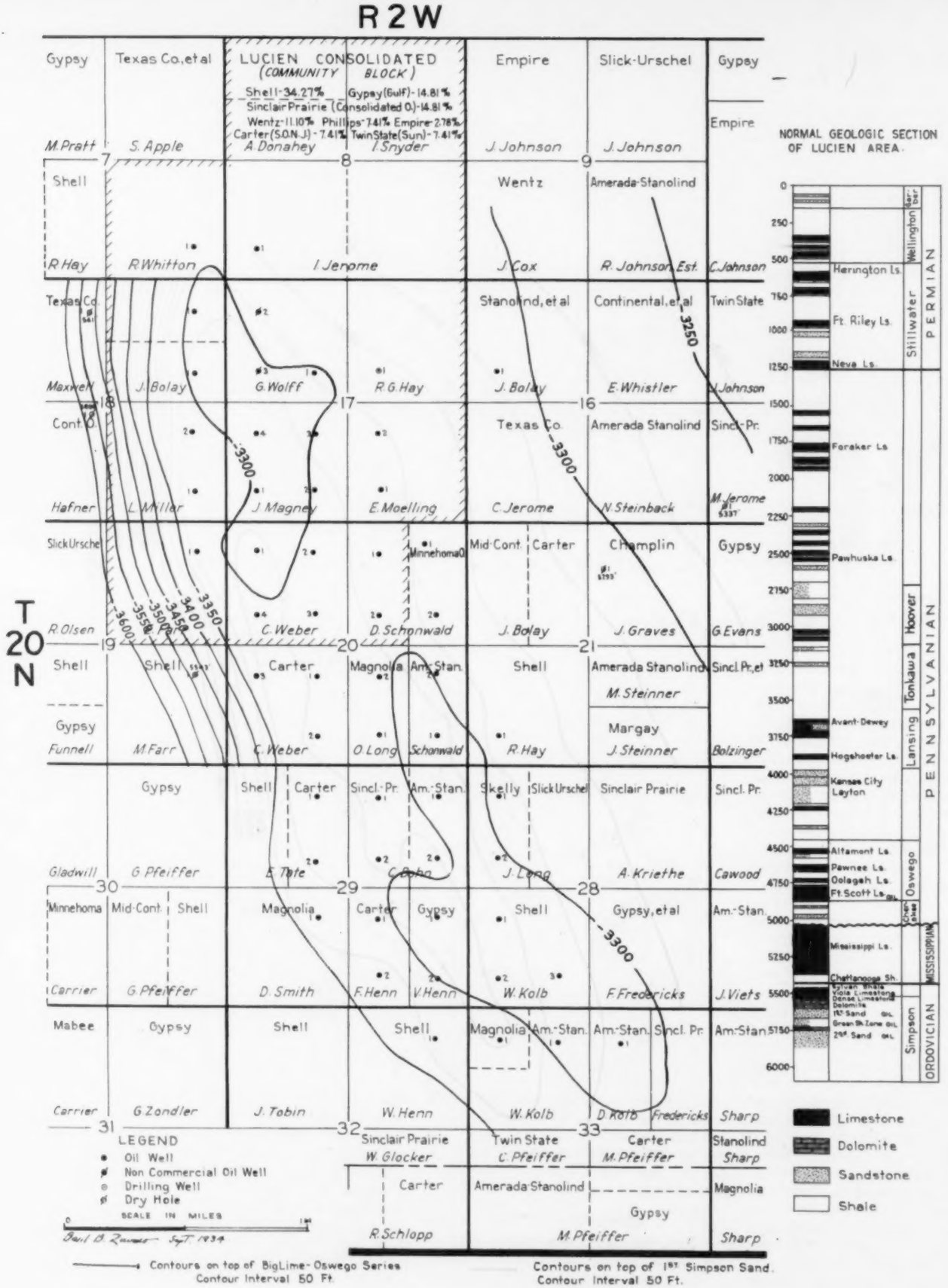
Class	Number of 40 Acre Units	Estimated recovery per acre: 40-acre Locations (Bbl.)	Estimated recovery per acre: 10-acre Locations (Bbl.)
1	6	27,500	37,500
2	13	20,000	25,000
3	17	7,500	15,000
4	11	1,500	3,000
5 (marginal)	7	minimum	minimum



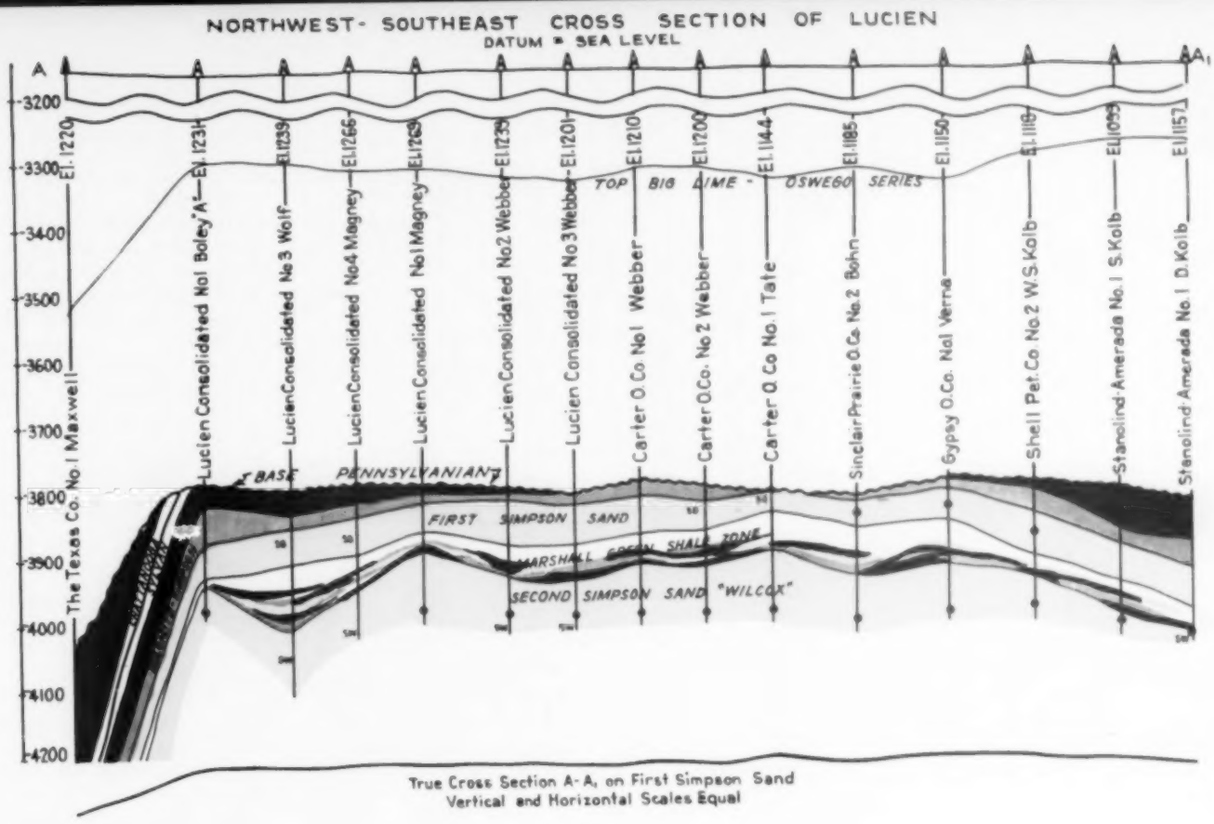
Map showing location of Lucien field in Oklahoma in relation to major structural features.

Production Methods

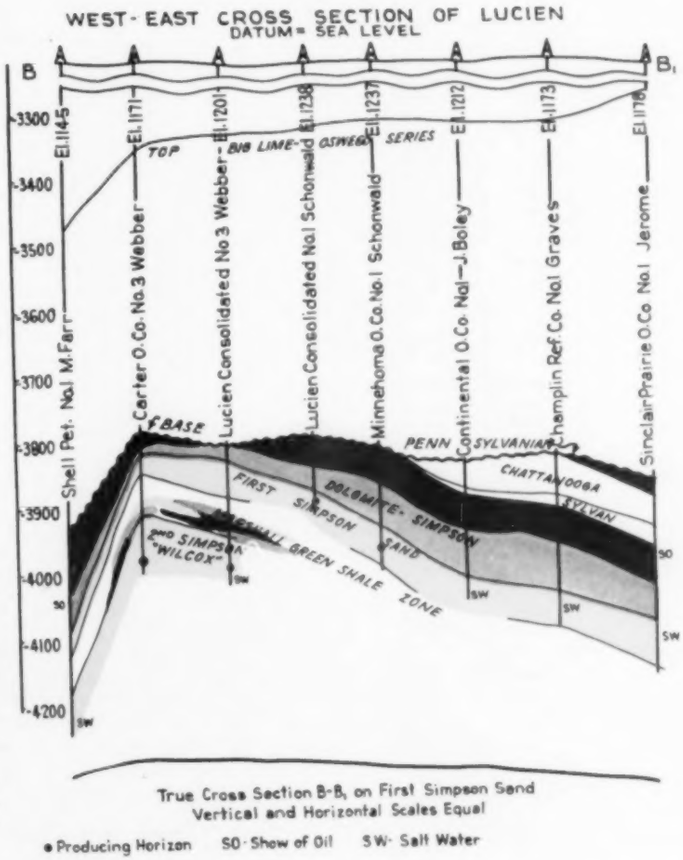
ALL DRILLING in the Lucien field is done with heavy rotary rigs. The motive power is supplied principally by steam engines, boilers using natural gas for fuel, though both electric and gasoline installations have also been used. The drilling is performed under contract exclusively as is the current practice in Oklahoma. The cost of drilling is estimated to average $55,000 per well including all surface equipment, separators and tanks for completion. The time for drilling in a producer in Lucien averages 60 days. Heavy rotary rigs are used to drill to the top of Simpson formation where the only string of casing is set, and the wells at that depth, around 4,900 to 5,000 ft., standardize and drill into the producing horizons with cable tools. The accepted casing practice includes around 250 ft. of surface pipe and, as indicated, 4,900 to 5,000 ft. of



***Subsurface** structure **and development** map **and geologic column** of **Lucien pool.** Contours **drawn on top of** Oswego **limestone and** on top **of first Simpson** sand **showing sharp** relief on **Ordovician formations** (**yellow** contour lines) **as compared with** gentle **folding in Pennsylvanian** (**blue** contour lines).*

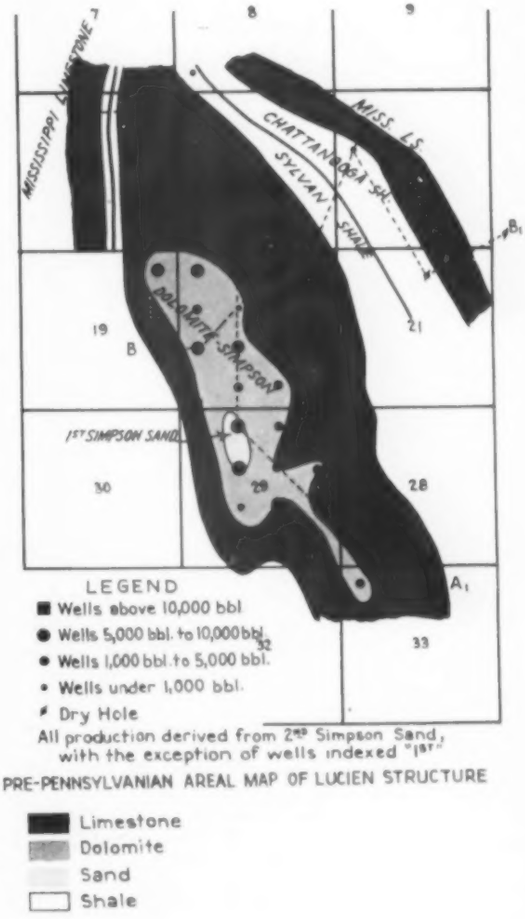


True Cross Section A-A, on First Simpson Sand
Vertical and Horizontal Scales Equal



True Cross Section B-B, on First Simpson Sand
Vertical and Horizontal Scales Equal

● Producing Horizon SO - Show of Oil SW - Salt Water



PRE-PENNSYLVANIAN AREAL MAP OF LUCIEN STRUCTURE

Limestone
Dolomite
Sand
Shale

Geologic cross section and pre-Pennsylvanian areal map of Lucien field in Oklahoma. Colored cross sections show exaggerated scale ratio, vertical scale being 13 times larger than horizontal; actual dips are indicated by "true" sections on first Simpson sand, shown in solid black lines under colored sections.

8⅝-inch casing; the surface casing is usually cemented with 250 sacks of cement and the main string with between 750 and 1,200 sacks. Since all drilling contracts now include a provision requiring straight holes, the contractors and drillers make a definite effort to avoid crooked holes, and in Lucien field, therefore, all wells may be considered quite straight.

After drilling in with the cable tools and completion the wells in Lucien are produced through 2½ or 3-inch tubing with a 2-inch maximum choke. Considerable experimentation is still being conducted to find the most efficient method of producing large wells under proration, the present tendency being to permit a flow of around 100 bbl. per hour in fulfilment of allowables. At that rate gas waste appears to be minimal. All wells in the Lucien field still flow naturally, with the exception of three or four very small producers which are being swabbed. At this time Lucien Consolidated is constructing a compressor station on the unitized block and will introduce gas lift in the near future. Acid treatment was tried in Lucien without effect, because the sands are cemented with siliceous material insoluble in currently used acids. If, however, hydro-

Individual Well Records in Lucien Field

Company and Lease	No. of well	Section T20N-R2W	Initial Production 24 hrs.	Old Potential 12 hrs. x 1.88	New Potential August 1934 12 hrs. x 1.88 (new wells added)	Increase or Decline	24 hr. Gas Volume	Gas/Oil Ratio	Bottom Hole Pressure at Approximately —3900 ft.	Cumulative Production to Sept. 30, 1934
Lucien Consolidated										
J. Bolay	1	18	1,708	1,606	827	—48.51	500	568	919	70,000
B. Bolay	1	18	5,481	5,481	4,758	—13.19	3,610	713	1,773	87,500
E. Farr	1	19	4,680	4,680	2,938	—37.22	1,392	445	540	300,400
I. Jerome	1	8	530	497	383	—22.94	75	184	818	35,400
J. Magney	1	17	4,852	4,852	2,389	—50.76	1,872	736	1,763	123,900
	2	17	897	897	472	—47.38	200	398	1,130	25,500
	3	17	775	775	423	—45.42	175	389	1,626	16,800
	4	17	small							4,800
L. Miller	1	18	4,311	4,311	2,852	—33.84	1,700	560	1,734	168,000
	2	18	7,270	7,270	7,635	+ 5.02	4,225	520	1,662	57,000
E. Moelling	1	17	1,342	1,342	545	—59.39	200	345	1,416	35,300
	2	17	10,500	new	10,500	new	8,248	784	1,673	11,000
D. Schonwald	1	20	11,250	2,644	2,932	+10.89	3,480	1,115	1,185	405,600
	2	20	6,785	6,785	4,183	—38.35	4,968	1,116	1,229	78,800
R. Whitton	1	7	10,500	1,077	847	—21.36	1,488	1,651	785	502,300
G. Wolff	1	17	1,739	1,701	665	—60.91	236	334	1,821	108,500
	2	17	small							1,700
	3	17	small							1,100
C. Webber	1	20	5,001	5,001	3,546	—29.11	2,592	687		147,500
	2	20	939	939	minimum				1,275	29,000
	3	20	966	966	848	—12.22	200	222	1,598	16,000
	4	20	4,500	new	4,500					11,200
Shell Petroleum Corporation										
R. Hay	1	21	1,090	1,090	626	—42.57	240	360	1,591	26,300
W. Kolb	1	28	2,135	2,135	2,035	— 4.68	700	323	1,847	24,400
	2	28	2,679	2,679	2,583	— 3.58	1,390	506	1,883	21,700
	3	28	250	new	250					5,000
W. Henn	1	32	1,150	new	1,150					7,000
Carter Oil Company (S.O.N.J.)										
F. Henn	1	29	6,061	6,061	5,598	— 7.64	4,923	827	1,841	57,000
	2	29	980	new	980					5,500
E. Tate	1	29	8,001	8,001	7,633	— 4.60	6,107	752	1,818	101,500
	2	29	6,572	6,572	5,886	—10.44	5,747	918	1,813	45,500
C. Webber	1	20	4,597	4,597	3,633	—20.97	3,048	789	1,814	95,000
	2	20	3,621	3,621	3,100	—14.39	2,300	697	1,703	66,500
	3	20	4,287	4,287	4,341	+ 1.26	3,170	686	1,823	30,500
Gypsy Oil Company (Gulf)										
Verna	1	29	3,626	new	3,626		4,256	1,103	1,825	16,000
	2	29	4,547	new	4,547		3,669	758	1,785	25,300
Magnolia Petroleum Company (Socony-Vacuum)										
W. Kolb	1	33	1,442	1,442	1,333	— 7.56	1,365	963	1,918	20,000
O. Long	1	20	2,373	2,373	1,910	—19.51			1,758	34,600
	2	20	2,182	2,182	1,484	—31.99	8,205	5,196	1,341	36,000
D. Smith	1	29	507	507	minimum					5,500
Minnehoma Oil Company										
D. Schonwald	1	20	1,756	1,756	1,353	—22.95	866	602	1,610	60,000
	2	20	782	782	minimum				1,678	14,000
Sinclair Prairie Oil Company (Consolidated)										
C. Bohn	1	29	2,502	2,502	1,975	—21.06	1,275	607	1,779	35,600
	2	29	3,000	new	3,000					12,800
Skelly Oil Company										
J. Long	1	28	1,175	1,175	1,015	—13.62	757	702	1,707	18,300
	2	28	2,266	2,266	2,088	— 7.86	2,940	1,323	1,808	20,600
Stanolind Oil and Gas Company (S. Indiana) and Amerada Petroleum Corporation										
C. Bohn	1	20	1,490	1,490	1,098	—26.31	1,032	884	1,658	24,500
	2	29	1,737	1,737	770	—55.67	499	609	1,767	21,700
D. Kolb	1	33	327	327	minimum				1,950	16,400
W. Kolb	1	33	823	823	1,019	+23.82	501	462	2,046	67,400
D. Schonwald	1	20	1,512	1,512	656	—56.61	751	1,076	1,457	39,000
	2	20	518	518	minimum				1,845	12,200
J. Bolay	1	16	250	50	50					22,500
Averages						—17.23	2,180	814	1,594	
Totals	53		158,264	111,309	114,982					3,225,600

Summary of Lucien Operations by Companies

	Initial Production	Old Potential 12 hrs. x 1.88	New Potential 12 hrs. x 1.88 (new wells added)	Cumulative Production to Sept. 30, 1934	Number of wells	Sept. 1934 Allowable		Total Estimated Cumulative Reserves	
						month	per day	spacing one well to 40 acres	spacing one well to 10 acres
LUCIEN CONSOLIDATED	84,026	50,824	51,243	2,237,464	23	92,950	3,095		
Carter Oil Company (S.O.N.J.)*	39,369	36,909	33,981	567,400	6**	69,711	2,324	7,335,000	9,703,000
Shell Petroleum Corporation*	36,129	23,327	24,017	850,264	5**	47,095	1,569	4,545,000	6,924,000
Gypsy Oil Company (Gulf)*	20,643	9,150	15,753	373,000	2**	23,314	776	3,150,000	4,168,000
Sinclair Prairie Oil Company (Consolidated)*	17,972	10,020	12,555	380,100	2**	19,412	647	2,150,000	3,368,000
Stanolind Oil and Gas (S. Indiana) and Amerada	6,657	6,457	3,593	203,700	7	15,422	514	1,070,000	1,940,000
Magnolia Petroleum Company (Socony-Vacuum)	6,504	6,504	4,727	96,100	4	8,456	282	900,000	1,800,000
Wentz Oil Company*	9,303	5,645	5,670	248,300	0**	10,320	344	1,160,000	1,625,000
Phillips Petroleum Company*	6,230	3,770	3,790	165,900	0**	6,890	229	775,000	1,083,000
Twin State Oil Company (Sun)*	6,230	3,770	3,790	165,900	0**	6,890	229	775,000	1,083,000
Skelly Oil Company	3,441	3,441	3,103	38,900	2	6,110	203	600,000	900,000
Minnehoma Oil Company	2,538	2,538	1,353	74,000	2	5,294	176	360,000	540,000
Empire Oil Company*	2,270	1,410	1,420	62,200	0**	2,580	86	290,000	406,000
Totals	157,286	112,941	113,752	3,225,764	53	221,494	7,379	23,110,000	33,540,000

* Includes pro rata interest in the Lucien Consolidated
** Does not include wells operated by the Lucien Consolidated

fluoric acid is eventually adopted it may be successful in Lucien.

The cost of lifting crude oil in Lucien varies considerably. On the most prolific leases the cost of production is from 3 to 5 cents per barrel, on leases where much work must be done the costs have been as high as $1.00 per barrel, the average for the field probably being around 10 cents per barrel. Gas lift production, when introduced, will average around 30 cents per barrel.

While Lucien was discovered in September of 1932, the field was not classified for proration and production by the State Corporation Commission until July of 1933, in which month the field produced 67,425 bbl. Subsequently the Corporation Commission increased the allowable production in Lucien to as high as 200,000 bbl. per month during summer months, and reduced it to 150,000 bbl. per month during slack consumption season. The actual allowed production recently averaged about 7 percent of the potential flow. Since discovery and to September 30, 1934, the Lucien field produced a total of 3,225,600 bbl., or an average recovery per acre of 1,520 bbl.

The production of 3,225,600 bbl. to date has been characterized by a very sharp drop in bottom-hole pressures in Lucien. The original bottom-hole pressure was around 2,200 lbs., while by August of 1934 it dropped to 1,600 lbs., or a decline of 200 lbs. per 1,000,000 bbl. produced. Such precipitate decline is due to the fact that Lucien is a typical gas energy field, and the water drive probably does not contribute at all to lifting of crude oil since oil is withdrawn from the tight Simpson sands much faster than water can follow. In the future the rate of decline of bottom-hole pressures will gradually slow up, and may average in the future not over 100 lbs. per 1,000,000 bbl. lifted, particularly if gas lift is introduced. The wells may continue to flow if they maintain sufficient fluid level and if they are kept in good condition with as low bottom-hole pressure as 500 lbs., which is the case with the Lucien Consolidated No. 1 E. Farr in section 19 which produced to date 300,400 bbl. showing in August, 1934, a new potential of 2,398 bbl. per day and a bottom-hole pressure of only 540 lbs. Wells with smaller initial production, however, could not possibly maintain a high fluid level as long as did No. 1 E. Farr and will probably discontinue flowing when their bottom-hole pressures drop to around 800 to 1,000 lbs. It is estimated that around 10,000,000 to 12,000,000 bbl. may still be recovered from the Lucien field under conservative operating conditions by natural flow, before wells will have to be pumped. While the average bottom-hole pressure in August of 1934 in Lucien was around 1,600 lbs., the most prolific portion of the field, and the most recently developed, the south half of section 20 and section 29, still showed bottom-hole pressures slightly in excess of 1,800 lbs.

The gas oil ratio in Lucien is not excessive, averaging in large wells about 800 cu. ft. per barrel of oil lifted; it varies from around 400 cu. ft. to 1,100 cu. ft., with one well, Magnolia Petroleum Company's No. 2 Long in section 20, producing 5,196 cu. ft. of gas per barrel of oil.

The potential production in Lucien field is calculated by the State Corporation Commission on the basis of actual 12-hour gauges multiplied by 1.88 for 24-hour assigned potential.

Cost and Profit

FOR THE drilling of 53 completed wells the operators of Lucien field spent about $2,920,000. The production cost of 3,225,600 bbl. recovered to date was about $325,000, bringing total expenditures to date to $3,245,000, which figure, however, does not include the original cost of leases and expenses of discovery work. Similarly producing costs do not include the overhead of general offices and other indirect expenditures.

The produced crude oil brought to the operating companies at $1.00 per barrel $2,822,600, after excluding ⅛-th fee owners' royalty, and therefore the Lucien field operators, as a whole, will begin showing profit within 2 to 3 months, though operators of the more prolific leases unquestionably are already operating in the clear.

The cumulative recovery of 23,110,000 bbl., based on 40-acre spaced locations, will cost the operators about $5,000,000 to produce, or a total drilling and production cost of about $7,920,000 which with $1.00 crude would indicate a net profit of about $12,300,000, after royalty payments of $2,890,000.

The closer spacing of wells, eventually reaching one well to each 10 acres, would require drilling of about 150 new wells costing around $8,250,000, and resulting in an additional cumulative recovery of some 10,000,000 bbl. bringing the operators $8,750,000 gross, or about $6,250,000 after deducting cost of production. In actual practice, however, 10-acre spacing could be used only in the more prolific sectors of the field in which case around 75 new wells, costing about $4,125,000, could probably increase the cumulative recovery of Lucien by 8,000,000 bbl., bringing the operators $7,000,000 gross, or $5,000,000 after deducting cost of production, thus showing an apparent profit of $875,000. In fact, however, most of the production in the Lucien field is owned by major companies and while above balances would show on books of producing subsidiaries, the additional crude oil may and prob-

ably will be more valuable to the integrated companies than the posted prices would indicate.

The unitized and conservative operation of Lucien has been therefore directly responsible for great saving in drilling costs and also in saving gas energy, which will result eventually in smaller lifting costs. The slow and careful drilling campaign prevented starting of many edge wells which would have been completed either as failures or semi-failures and which would have probably resulted under competitive drilling in a waste of at least $1,000,000. While 40-acre spacing is a debatable practice for the greatest cumulative recovery per acre, in the Lucien field it has been an economically sound development to date, provided that in the future the most prolific portions of the field will have additional wells drilled to produce the greatest possible volume of oil with minimum drilling. It should be indicated that under existing lease requirements and practices operators do not have a choice to space wells at will and, for instance, 20-acre spacing is impossible.

Pipe Lines and Markets

THREE pipelines serve the Lucien field, all connecting with their respective trunk systems near Cushing, Oklahoma, about 40 miles due east. Shell Petroleum Company operates a combination 6- and 8-inch line running currently about 4,000 bbl. per day; Oklahoma Pipe Line Company (Carter-S.O.N.J.) operates an 8-inch line moving daily about 3,500 bbl. and Stanolind Pipe Line Company (S. O. Indiana) operates also an 8-inch line running only around 500 bbl. per day. All Lucien crude oil is mixed with other crudes in Cushing, where it reaches trunk pipelines, and is then transported to Eastern and Great Lakes refineries.

Sub-surface Geology

THE GEOLOGICAL section in the Lucien field comprises about 1,250 ft. of lower Permian and 3,750 ft. of Pennsylvanian sediments, before encountering the producing sands of Ordovician age. Off structure up to 375 ft. of Mississippian sediments are present. The stratigraphy of Lucien area is briefly reviewed here, the formations being discussed in the order of penetration.

As already indicated the Lucien shale member of Garber sandstone, Permian, is the outcropping formation over most of the area, with Wellington formation outcropping in the eastern and southern sections of T. 20 N., R. 2 W. The Wellington formation consists primarily of red shales with gypsum beds in its lower part, and it measures around 500 ft. in thickness in the Lucien field. Below the Wellington is the Stillwater formation, with a thickness of about 650 ft., consisting of dark brown to gray shales with several well developed limestone beds, including the Herington, Fort Riley and Neva, the latter marking the base of Permian sediments.

Analysis of Lucien Crude Oil

Color	green
Odor	sweet
Sulfur	0.21 percent
Gravity	41.8 degrees A. P. I.
Gasoline	40.33 percent; 61.5 gravity; initial 100 deg. F.; End point 404 deg. F.
Kerosene	16.70 percent; 41.0 gravity
Residue	41.90 percent; 27.3 gravity
Loss in analysis 1.07 percent	

The upper Pennsylvanian section, considered here to the base of Pawhuska limestone, about 1,450 ft. in thickness, consists almost entirely of gray shales with few thin limestone beds, of which the Foraker and Pawhuska groups are best developed and serve as first definite markers in deep drilling.

The middle Pennsylvanian section in the Lucien field is about 1,900 ft. thick; it consists principally of gray shales with several major sand series, the Hoover, Tonkawa and Layton, all of which produce petroleum commercially in northeastern Oklahoma, especially in the Garber and Tonkawa fields, but which are barren of oil or gas, and probably are water-bearing, in Lucien. The Layton sand series encountered at around 4,000 ft. are represented by a coarse grained and in part loosely bonded sand which with rotary drilling requires heavier drilling muds to prevent loss of circulation. Several thin limestones occur in the middle section of Pennsylvanian, the Avant-Dewey, Hogshooter and Checkerboard being the most consistent.

The lower Pennsylvanian can be divided into the upper Oswego limestone group and the lower Cherokee shale section. The Oswego group, about 400 ft. in thickness, consists primarily of several thick limestones and dark gray to black shales; the limestones within this group are named individually but in general practice are carried under the group name. The limestones in the Oswego section are usually gray and white, finely crystalline, with the basal part buff to brown, coarsely crystalline, very fossiliferous and bearing petroleum and little gas. Only one well, Stanolind Oil and Gas Company's et al. No. 1 J. Bolay in section 16, is producing from the lower Oswego limestone section at around 4,780 ft., having been brought in, after acid treatment, for around 250 bbl. per day and having produced to September 30, 1934, 22,500 bbl. Oil saturation of the lower Oswego section was reported in many other wells, which drilled through it with rotary rigs without testing, and in future with higher crude oil prices and more effective acid treatment the exhausted Ordovician sand wells will be probably plugged up to the Oswego pay horizon to add a little to total reserves of Lucien. The Cherokee shale section in Lucien is about 125 ft. in thickness and consists of dark gray micaceous shales and brown micaceous sands which usually show traces of oil, but are not sufficiently developed for commercial accumulation.

The Cherokee shale section is the basal member of Pennsylvanian age and it overlies unconformably the pre-Pennsylvanian beds. In the Lucien field a small thickness of detrital material, up to 25 ft., is occasionally found below Cherokee and it represents the earliest Pennsylvanian erosional phase.

In Lucien the structural folding and subsequent truncation entirely removed from the producing area of the field all formations of Mississippian age, the Mississippi limestone and Chattanooga shale, also cutting part of the Ordovician beds, down to the upper part of the first Simpson sand, from the structurally highest portions of the field. In several failures completed away from the pool normal sections of Ordovician and Mississippian have been encountered. The Mississippi limestone, a gray to buff, finely crystalline sugary limestone with residual chert at the top, measures up to 315 ft. in thickness in the Continental Oil Company's failure in section 18, while the Chattanooga carbonaceous black shale is uniformly 50 ft. in thickness in its normal section.

The Ordovician sediments in the Lucien field furnish the principal oil producing horizons. The uppermost member is the Sylvan gray green splintery shale measuring in T. 20 N., R. 2 W. about 35 ft. in thickness, but this formation is not present over the producing area, having been eroded away. Viola limestone follows Sylvan shale and its thickness in the field varies from 0, where it has been removed, to about 60 ft. The Viola is represented by grayish white and pink coarsely crystalline limestones and dolomitic limestones. This section may be sub-divided into Fernvale and Prosser, the latter being the best developed in Lucien. Viola lime-

stone is not usually oil bearing in Lucien, though Sinclair-Prairie Oil Company's failure in section 15, one mile due east from the field, showed free oil at 5,146 ft. in this horizon.

A group name of Simpson is assigned to all Ordovician sediments underlying Viola limestone and above the Arbuckle limestone of Cambro-Ordovician age. Simpson varies considerably in the type of sedimentation and lithology even in nearby localities in Oklahoma, in general consisting of alternating dolomitic limestones, dolomites, thick sand bodies and green shales. In Lucien, Dense limestone, buff in color with small imbedded dolomitic crystals, is the first member of the Simpson group and it measures from 0, where it has been eroded away, to 20 ft. in thickness. Simpson Dolomite section follows Dense, consisting of buff dolomite and limestone and ranging in thickness from 0, where it has been removed, to 40 ft.

The first Simpson sand underlies Dolomite section. It is predominantly sand with but little dolomite and green shale. Usually it is very tightly cemented with siliceous material which is not susceptible to present acid treatment. First Simpson sand, also called first Bromide, has been found to be in portions of Lucien field either porous or fractured and on four such locations the best wells in the pool, both in initial production and recoveries to date have been completed. But with the above very few exceptions the first Simpson has been most disappointing and has been responsible for dry holes in the sections of the pool where second Simpson is found below the water level. First Simpson sand is fairly uniform in thickness, averaging about 60 ft., and thinning to around 40 ft. in the highest part of the field around the northwest quarter of section 29 and southwest quarter of section 20.

The Marshall Green Shale zone found beneath the first Simpson sand consists of green shale, limestone, dolomite and sand. This section is extremely variable in thickness from location to location, and in places wells which correlated as certain producers on top of the Green Shale zone lost their structural advantage due to its unexpected thickening, and drilled into second Simpson sand below the water level. Marshall zone varies from 5 and 10 ft. in thickness to as high as 75 ft., averaging around 50 ft.; and in one well, Lucien Consolidated No. 3 Wolff in section 17, it was found to be exceptionally thick reaching 160 ft. While not generally productive, in a few wells the Marshall zone developed some production in discontinuous sand bodies, the discovery well, Lucien Consolidated No. 1 Wolff, producing from this horizon 1,817 bbl. initially at 5,197 ft.

The second Simpson sand, or second Bromide, underlies the Marshall Green Shale zone and is the main producing horizon in the Lucien field. Its upper 80 to 100 ft. consist of fine grained and in places well cemented sand. The principal production in Lucien is derived from this section in a zone found at about 70 ft. from its top. The actual "pay" sand in Lucien in the second Simpson is estimated to be from 15 to 20 ft. thick, but while the porous section may not exceed this thickness, undoubtedly less porous portions of the sand drain gradually into the "pay," thus complicating the calculation of cumulative reserves. Below the fine grained sand section is found a coarse grained sand, correlated with the true "Wilcox" sand, and producing in a few wells where it has been found above water level.

Geologic History

SEVERAL views exist in regard to the development of structural features and source beds of petroleum in Central Oklahoma. The following brief review here of the Lucien area is not claimed to be an universally accepted theory, rather the author's conclusions arrived at after detailed studies and exchange of views with other students of the problem.

The earliest Cambro-Ordovician sediments, the Reagan sandstone and Arbuckle limestone, are not considered here since they have not been penetrated in the Lucien field; this section can be approximately estimated at 2,000 to 2,500 ft. The sediments of the Simpson group lie in general conformably on the upper Arbuckle limestone section, though secondary unconformities probably do exist in the transitory stage. In the Lucien field the Simpson group itself shows many minor unconformities, in the drilled section probably as many as 40. Some of these unconformities are quite unimportant, but others are well defined by erosional zones showing dolomitic conglomerate and sand with bituminous oil residue, Stanolind Oil and Gas Company's No. 1 W. Kolb in section 33 drilling through such section from 5,018 to 5,020 ft. at the base of the first Simpson sand. Apparently therefore the Simpson deposition on the Lucien structure was accompanied by frequent emergence and submergence in shallow waters, and very likely the area already in Simpson time had some structural relief. Quite definitely the bituminous oxidized residues sealed within Simpson sands indicate that the petroleum originated at the time of Simpson deposition; moreover it can be deduced that the shallow seas covering at times the Lucien positive area were favorable for the local development and accumulation of the organisms that upon deposition were converted into petroleum.

Within the Simpson group in the Lucien field the more pronounced unconformities are indicated at the base of second Simpson sand and above "true" Wilcox, in Marshall Green Shale zone, in the lower section of first Simpson sand and at the base of Dolomite and Dense sections. After Simpson time and a period of brief emergence the Viola limestone and Sylvan shale were deposited. Hunton limestone, not present in Lucien, was deposited conformably on the Sylvan shale, and after Hunton deposition followed a period of emergence with important structural movements and peneplanation. Lucien structure probably developed sharp relief features at that time, and possibly most of the truncation of Ordovician sediments in the field took place then. Early in Mississippian time Central Oklahoma, reduced to a fairly flat plain, was again submerged and there followed a period of uniform deposition of Chattanooga carbonaceous shale and Mississippi limestone, averaging 50 ft. and 300 ft. respectively in normal sections. There is some question whether the Lucien high was submerged at that time, but it may be the safest to conclude that some submergence took place and that a thin section of Mississippian sediments was laid down on Lucien structure. Another period of uplift and peneplanation took place at the close of Mississippian age and early in Pennsylvanian, eroding away all Mississippian sediments from the Lucien, if they were deposited at all, and probably cutting into already truncated Ordovician formations, Viola and Simpson. It is here suggested that the uplift culminating with the close of the Hunton period was responsible for about two thirds of the present Lucien structural relief and Ordovician erosion, while the uplift ending in early Pennsylvanian time added the remaining one third to the relief and was responsible for the erosion of some Ordovician and of all Mississippian, if the latter was deposited. Undoubtedly the structural uplift continued uninterrupted with variable intensities from early Ordovician age, the above mentioned two periods merely marking the movements of greatest extent.

Following late Mississippian and early Pennsylvanian emergence and erosion came a practically unbroken period of deposition during which all of the Pennsylvanian and Permian sediments were deposited. In Pennsylvanian some unimportant unconformities are known to exist in Layton and Tonkawa sand series marked by red shale breaks. The struc-

ture on Pennsylvanian and Permian formations in Lucien is only a reflection of underlying relief, gradually reduced, compensated by subsequent sedimentation. Thus while on top of the first Simpson sand at around 5,000 ft. there is about 300 ft. of closure and 900 ft. of west dip in the distance of half a mile in the Lucien field, on top of Oswego series at around 4,500 ft. there is but 50 ft. of closure and 320 ft. of west dip in the same distance, and on surface formations there is no closure at all and only around 150 ft. of west dip in the half mile. The extent of relief on Ordovician and its sharp reduction on Oswego series suggest, in addition to the known reentry of Mississippian, a fault of some extent in Pre-Pennsylvanian sediments, which has been probably almost entirely compensated for by the great thickness of Cherokee shale section, which increases from around 125 ft. in the field proper to over 200 ft. in the west side failures.

Directly related to the structural history of the field is the cementation of the Simpson sands with siliceous material. Apparently it occurred during the Ordovician Simpson periods of emergence of deposited sands, after accumulation and sealing of oil had already taken place, and was due to circulation of meteoric waters carrying silica in solution. Quite naturally such cementation did not in all places penetrate to the same depth, resulting in considerable variations of producing level in the first Simpson sand, to which must be added the possibility of fracturing and therefore oil encountered in the first Simpson is not related to any definite section of the sand or any definite portion of the field, though greater structural stresses and in consequence greater fracturing should have taken place along the east side of the field where, in fact, large first Simpson sand wells are found. Certain irregularity in encountering oil and water in the second Simpson also exists, but it has not been as great as reported and can be accounted for by secondary unconformities within Simpson, by siliceous cementation as indicated above and by water level tending to some extent to follow the structure, more particularly in cases of fairly tight sands as in Lucien.

Conclusion

LUCIEN field with its 20,000,000 to 30,000,000-bbl. reserve of petroleum is representative of the larger oil fields in Mid-Continent, though not in the class of the few major market disturbing pools. Annually many millions of dollars are being spent by oil companies and independent operators on geophysical exploration and drilling of wildcat wells in Oklahoma, but as the time goes on it is more and more difficult to locate new large sources of supply. Lucien was opened in 1932, the less important Crescent and South Burbank in 1933 and, possibly, the major Fitts late in 1934; in these years Oklahoma produced 181,506,000 bbl., 153,244,000 and estimated 165,000,000 bbl. respectively, thus indicating that new supply in the state is far from sufficient to maintain Oklahoma's present rate of production. A number of smaller oil fields were discovered in Oklahoma in these last three years but their reserves are of but little influence in the consideration of national resources and the effect of exhaustion of flush production.

▼

A New Oil-Suction and Discharge Hose

HOSE designed specifically for loading and unloading oil tankers has been in use for many years. Since it undergoes abrasion from contact with docks and the decks of boats, exposure to oil and grease, and prolonged immersion in water and mud, a great deal of effort has been expended to develop a product which would meet in a satisfactory manner these severe conditions.

Oil discharge hose is made of successive layers of rubber, heavy cotton fabric, and steel wire. These materials are built on a mandrel after the nipples have been placed in position so that the ends of the hose are constructed directly upon the nipples. Formerly, the most successful practice in the attachment of nipples was by means of clamps bolted tightly on the outside of the hose. In addition to the clamps, heavy-gauge wire was wound on spirally under high pressure after the hose was vulcanized, to reenforce the end of the hose around the nipple.

But there were practical objections to clamps. They not only made the hose clumsy to handle, but injured the decks and equipment of the boats. More important than this, due to the presence of free oil and other inflammable materials on and about tankers and refinery docks, they were quite as great a fire risk as the leaky nipples because of their tendency to strike sparks in contact with metal fixtures.

These objections to clamps led to the adoption of the clampless nipple. The method of manufacturing oil hose with this type of attachment differs from that employed in the case of clamp nipples in two ways. (1) During the process of building the layers or plies of unvulcanized rubber and fabric impregnated with rubber, the nipple binding-wire is spiralled into the structure under high tension, instead of being wound externally. By this means, the plies of the hose-carcass are compressed tightly. (2) This tension is applied before vulcanization instead of after, as was the practice with clamp nipples.

Nevertheless, in spite of the carcass of the hose being wound against the nipple, the high temperature necessary for vulcanization causes the plies of rubber to soften and flow before actual vulcanization begins. This is characteristic of rubber and cannot be avoided. This loosening of the structure during vulcanization is a vital defect of the clampless nipple, and in service oil often seeps between the plies of fabric and through the end of the hose around the nipple.

A new clampless nipple has recently been developed by the Boston Woven Hose and Rubber Co., Cambridge, Mass., which combines the advantages of the two types of attachment just described and overcomes their disadvantages. This nipple is so constructed that the loosening effect of vulcanization on the hose-carcass is later compensated by expanding internally the nipple itself to a corresponding degree (U. S. Patent No. 1,970,513, issued August 14, 1934).

This new improved nipple is made of special seamless steel pipe, which can be expanded after the hose is vulcanized. The length of the nipple is about two feet. In its central portion are two annular bulges or rings, six inches apart, also of seamless steel, which are welded to the body of the nipple and project approximately one-quarter of an inch. These rings are overlaid with three plies of high-grade rubber. After the hose is vulcanized, the six-inch section of the nipple between the rings is expanded, and the tendency to loss of pressure previously encountered with the clampless nipple is thus overcome.

Shortage of Flush Production Foreseen for California

R. E. Collom, Vice President, Continental Oil Company, Reviews California Reserves and Finds Present Visible Supply Insufficient to Maintain Current Rate of Production.

FROM time to time engineers, geologists, and others have prepared and published figures on recoverable or ultimate oil reserves in the fields of California. Nearly as often as these estimates have been made, improvements in drilling technique coupled with improved methods and tools in geological exploration have developed new and unforeseen sources of supply which have in a sense discounted the accuracy of reserve figures. Nevertheless, estimates are made and will continue to be made and used as a guide to the probable sources of future supply. Sometimes reserve figures are misused. It has been the fashion to say that there are so many billions of unmined reserves which at the current rate of consumption are only enough to last so many years. The total figure is divided by the annual consumption to arrive at the number of years the supply will last. Figures recently presented in a congressional investigation of reserves were immediately heralded in the headlines as representing 15 years' supply.

Everyone knows that production of a well, lease, field or district is recovered at a declining rate and that if California has at present 3,500,000,000 to 4,000,000,000 bbl. of unmined reserves such oil can not be recovered at the present rate of 220,000,000 bbl. per year, that being the rate averaged for the past 10 years. It will take a great deal longer than 15 or 20 years to get a considerable part of California's reserves out of the ground. New flush production will have to come into the picture within a very few years in order to maintain California's current supply in excess of 200,000,000 bbl. per year.

Another fallacy in reviewing reserves, particularly from a governmental conservation standpoint, is that reserves as estimated are based upon present methods of production allegedly inefficient, in that only 15 to 30 percent of the oil originally in place is recovered due to waste of gas, reservoir energy and generally inefficient methods of spacing, development, and recovery.

Methods of recovery are largely a matter of current economics. Rarely, except possibly in flush fields where large quantities of gas have been blown to the air, may they be said to be wasteful. If the price of oil were $3.00 per barrel, methods of recovery such as repressuring, water flooding, even mining might be instituted at old fields such as McKittrick and Kern River, where the top price of crude now is 57 cents per barrel. On the other hand if the price of oil were $3.000 per barrel flush fields might be more wastefully produced than has been the case. At any rate no great amount of reliance should be placed upon appreciable supplies being recovered by reclamation or rehabilitation. At best it is or will be a gleaning process and a very sizable proportion of flush production should continue to be necessary. No gleaning operations will ever give the state of California say 250,000 bbl. a day. Further, in considering reserves one must take the same view as in considering crude and gasoline in storage. They are not evenly or ratably held or owned nor can they be compared to capital investment, volume of business or any other similar yard stick. Ten companies, including six majors, probably own or control 85 percent of the visible future supply.

As soon as the townlot fields of the Los Angeles basin, which have dominated the California production situation since 1922, fade into the realm of depleted fields, it will be necessary to turn to various other means and methods to augment supply, such as opening up of old wells, the drilling and development of deeper zones and wildcatting. Neither the opening of old fields nor controlled development of deeper zones should bring in the same quantity of new production and reserves as has been made available in the past 12 years largely by townlot development in the Los Angeles basin. One of the most significant changes during this period has been the adjustment in the ratio between so-called refinable and fuel grades of crude. When the state was largely dependent upon San Joaquin Valley fields, and prior to the townlot discoveries in the Los Angeles basin, the proportions of fuel crude and refinable crude were 40 and 60; now the proportions are 10 and 90. In other words, estimated future recoverable oil is close to 3,000,000,000 bbl. of refinable grades, of which about half is in the North Dome of Kettleman Hills.

Wildcatting and development of new fields does not occur under any formula. There is nothing about it that is precise or that can be controlled. Oil is where you find it. At present, as everyone knows, we are passing out of the era of wildcatting on surface geology, such as obtained at Kettleman, the San Joaquin generally, and the chain of fields on the Newport-Inglewood rift in the Los Angeles basin, into the geophysical search for so-called buried structures with possible accumulations of oil and gas. Just as periods of rainfall run in cycles, with wet years and dry years beyond human control, so to some extent does the discovery of oil fields. We have had a cycle of "wet" years in oil discovery and it looks to the writer as though we are going into a "dry" cycle in exploration for oil in California.

The figures given in Table 1 are some previous estimates of California oil reserves. The writer has no comment to offer as to whether they were high or low, optimistic or the reverse. Being about to set forth a few estimates of his own he does not consider this the appropriate time to criticize unduly the estimates of others and he trusts that this consideration on his part will be met by a spirit of reciprocity.

In going over this tabulation it is noted that after the estimators got into their stride the estimates between 1915 and 1923 did not vary over 10 percent. Then, in 1926, approximately 1,000,000,000 bbl. were added to the estimated ultimate production because of discoveries previously made in the Los Angeles basin. The final estimate listed above is a jump of over 5,000,000,000 bbl. above the estimates made prior to the discovery in the Los Angeles basin of new pools and deeper sands, along with similar discoveries in coastal fields and the San Joaquin Valley, including the North and Middle Domes of

Kettleman Hills. It is safe to say that in the last decade the estimated ultimate production of the state has been doubled. In the same time approximately 2,225,000,000 bbl. have been withdrawn from reserves and consumed.

Oil Production

As already stated oil production in California during the past 14 years has been dominated by discovery and development of townlot fields in the Los Angeles basin. Whether or not we are prepared to admit it, the entire economic trend in the California industry, which includes price structures of crude, natural gasoline, gas and refined products, has been dominated by the production flowing out of Huntington Beach, Long Beach, Santa Fe Springs, and Playa del Rey.

Table 1

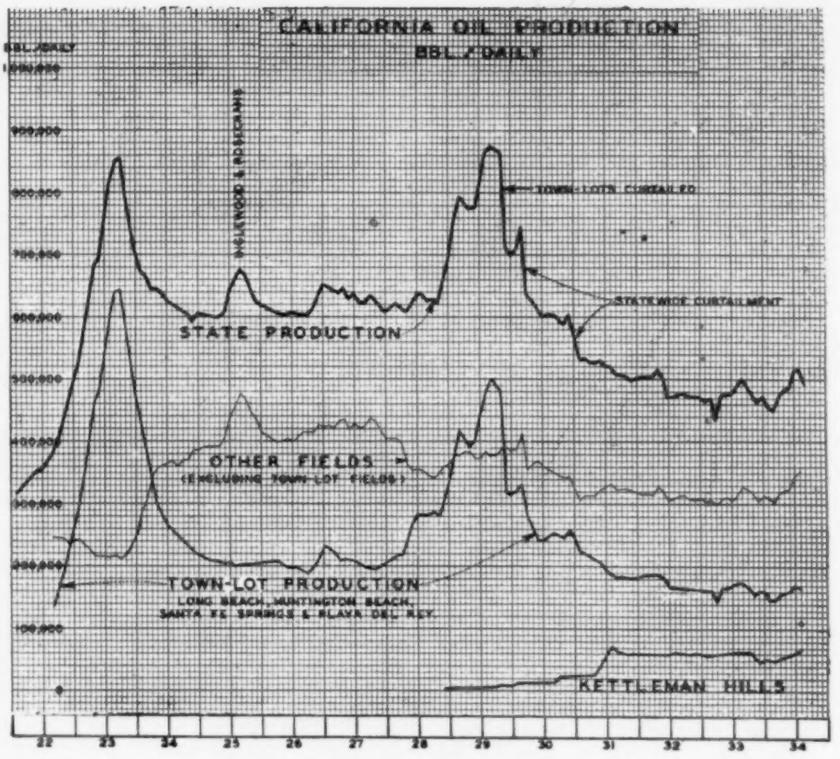
Estimates of California Oil Reserves

Date of Estimate	Authority	Ultimate Prod. Proved Oil Land (Bbls.)
1908	U.S.G.S., Day-Arnold	5,000,000,000
1912	Requa, M. L.,-Bell, A. F. L.	4,225,000,000
1915	Arnold, Ralph	3,041,274,000
1916	U.S.G.S., U. S. Bureau Mines, Senate Document 310	3,223,367,000
1917	Bureau of Mines, Beal, C. H.	3,300,000,000
1918	White, David	3,364,000,000
7-1-1921	Cal. Com. A.A.P.G.	3,095,000,000
1921	U. S. G. S.	3,314,000,000
1923	Collom-Barnes	3,521,152,000
1926	Heller, A. H.	4,307,064,000
7-1-1934	Stockman, L. P.	8,448,700,000

A glance at the accompanying chart shows that the graph for California oil production as a whole closely parallels the graph of townlot production. It shows that other fields of the state, excluding townlot fields, were not capable prior to the discovery of Kettleman of producing over 475,000 bbl. per day. The statement excludes Kettleman North Dome because it has been under super-control, as is shown on the chart.

The peaks and almost catastrophic irregularities in the graph of California production history are obviously due to townlot development. Uncontrolled, Kettleman North Dome would have made an all-time high peak in the graph but the successful efforts of interested operators as well as of those only indirectly interested are familiar to all. If any degree of the control exercised at Kettleman had been possible in the townlot fields proration in California, and the other economic difficulties that follow in its train, would never have been necessary.

The high peaks of California production consisted of 850,000 bbl. daily in the early part of 1923 and approximately 890,000 bbl. daily in August, 1929, just prior to the introduction of proration.



By comparing the townlot production curve with the state production curve it will be seen how much townlot production had to be restricted to make production effective.

The accompanying chart illustrates, by comparing the townlot graph with the state production graph, how much townlot production had to be restricted in order to make proration effective. Either of the humps in the graph illustrate what might have happened if Kettleman Hills had been under a townsite.

Records of production show that a total of 1,128,407,950 bbl. has been produced from Long Beach, Huntington Beach, Santa Fe Springs, and Playa del Rey from discovery to July 1, 1934.

In summarizing production figures we find that as of June 30, 1934, California's past production amounts to 4,162,895,947 bbl. The interesting thing to note about this figure is that it is about 1,000,000,000 bbl. higher than the last estimate made for ultimate recovery prior to the discoveries in the Los Angeles basin, starting with Huntington Beach, and is almost as high as the estimate of ultimate recovery made in 1926. In other words, in 1921 we were threatened with being "short" 1,000,000,000 bbl. on estimated ultimate supply but made it up by subsequent discoveries. Or, to put it another way, the state has produced more oil to date by 1,000,000,000 bbl. than was estimated to be ultimately recoverable in 1921. Unless history repeats itself and it is the writer's opinion, already expressed, that it will not, it should not be long until we are faced with a shortage in available current supply.

On the basis of an estimated ultimate production of slightly less than 7,500,000,000 bbl. for the state the summary in Table 2 shows the relation between past production and future reserves in the three principal districts.

Table 2

California Production and Reserves

	Past Production June 30, 1934	Estimated Future Production	Estimated Ultimate Production
San Joaquin Valley	1,780,294,898	2,345,705,102	4,126,000,000
Los Angeles Basin	1,994,084,491	664,815,509	2,658,900,000
Coastal	388,606,558	292,893,442	681,500,000
Total	4,162,985,947	3,303,414,053	7,466,400,000

The above totals on future recovery are believed to be conservative. On the other hand they may be too low. Another estimate recently published by Stockman[1] shows an ultimate state recovery of 8,448,700,000 bbl. and a consequent estimated future recovery of 4,285,700,000 bbl. If we assume that each set of figures was developed with equal care, and anyone will admit there is room for variation, we may also assume that available future supply lies between 3,303,000,000 and 4,286,000,000 bbl.

The accompanying Table 3 gives details of estimated reserves and ultimate recovery by districts and by fields.

Review of Recent Discoveries

IN THE San Joaquin Valley, Mountain View and Edison have recently been the scene of much new development. Hardly definable as recent discoveries, because discovery wells in each of these fields were drilled several years ago, recent developments have caused these fields to become the most active drilling spots in the state. Neither of these fields appears to be of such proportions as to make an appreciable addition to the reserve situation of the state.

Mountain View is being extended northwesterly in a long narrow strip of good wells, with initial productions in January, 1934, of 1,530 bbl. per day and, August, of 1,200 bbl. per day. The gravity of the oil varies from 20 deg. A.P.I. to 33 deg. A.P.I. The Edison area is undoubtedly something of a disappointment. Sudden and irregular changes in stratigraphy appear to be responsible for the accumulation of oil and make the oil correspondingly difficult to find. The initial productions have been low. The gravity runs from 14 deg. to 19 deg. A.P.I.

Also in the San Joaquin Valley the development of gas by Ohio Oil Company in its Buena Vista Lake test is believed by many to be a "boost" for geophysics, as the well was located on the basis of seismograph work. So far it may be said to be more of a "moral victory" for geophysics than otherwise, although some gas is better than no gas. Elk Hills has a gas zone overlying oil production and this might be the case at Buena Vista Lake.

In the Costal district the Santa Barbara Mesa area has been revived, although discovered several years ago, and some prolific wells have been obtained from Vaqueros sand. They appear to produce, however, at a rapidly declining rate.

Deep Sand Developments

DEEP sand developments in proved fields have met with varying degrees of success. A deeper sand immediately below the present producing horizons of Kettleman Hills was tested and the sand shut-in. This production, below the Whepley shale, was developed in Kettleman North Dome Association's well No. 38-34J. The well was plugged to produce from horizons above the Whepley shale. The proved Wagonwheel zone, deeper than the Deep Zone of North Belridge field, is the objective of a drilling program at North Belridge. Three wells have entered this zone and two wells are producing or can be produced. The Wagonwheel zone is similar geologically to Kettleman Hills. Two wells have been completed in the deep zone. One well on top of the structure showed an initial of 2,000 bbl. of 51 gravity oil. Wells in the Wagonwheel zone have shown initials as high as 7,200 bbl. per day of 40 gravity oil.

Search for deeper production at Lost Hills and Belridge has not rewarded the efforts of two major operators. A minor extension of the Kern Front field has been made or appears imminent.

In the coastal region deeper Sespe sand wells in the Elwood field have not been as prolific as in the overlying Vaqueros horizon. Recent developments along the South Mountain line of folding near Santa Paula suggest good deeper production from Sespe formation.

In the Ventura Avenue field, which is credited with the deepest producing well in the world, 9,710 ft., no recent deeper production has been developed although its depth limits have not yet been determined.

New deep zone developments at Inglewood and West Coyote fields have been encouraging, but the Montebello field

[1] Stockman, L. P., Oil Reserves, Oil and Gas Journal, 7-20-34.

Table 3

Estimated Future Production and Ultimate Reserves by Fields

L. A. BASIN FIELDS	Production to July 1, 1934	Estimated Future Prod.	Estimated Ultimate Reserves
Brea Olinda	148,596,647	51,403,353	200,000,000
Coyote (E. & W.)	137,378,366	62,621,634	200,000,000
Dominguez	66,449,707	58,550,293	125,000,000
Huntington Beach	209,990,196	55,009,804	265,000,000
Inglewood	90,303,292	94,696,708	185,000,000
Lawndale	878,492	371,508	1,250,000
Long Beach	513,810,574	166,189,426	680,000,000
Los Angeles	26,232,345	767,655	27,000,000
Montebello	93,988,526	11,011,474	105,000,000
Newport	129,019	20,981	150,000
Playa del Rey	26,134,995	23,865,005	50,000,000
Potrero	1,841,559	1,158,441	3,000,000
Richfield	73,192,961	16,807,039	90,000,000
Rosecrans	28,824,404	6,175,596	35,000,000
Salt Lake	38,178,501	1,321,499	39,500,000
Salta Fe Springs	378,472,185	64,527,815	443,000,000
Seal Beach	67,209,514	32,790,486	100,000,000
Torrance	76,399,406	13,600,594	90,000,000
Whittier	16,073,802	3,926,198	20,000,000
Total L. A. Basin	1,994,084,491	664,815,509	2,658,900,000

NORTHERN FIELDS	Production to July 1, 1934	Estimated Future Prod.	Estimated Ultimate Reserves
Coalinga	330,276,256	57,723,744	388,000,000
Elk Hills	130,467,444	199,532,556	330,000,000
Fruitvale	6,477,215	24,522,785	31,000,000
Kern River	294,747,985	55,252,015	350,000,000
Kettleman M. Dome	215,987	39,784,013	40,000,000
Kettleman No. Dome	79,322,899	1,420,677,101	1,500,000,000
Lost Hills-Belridge	73,321,057	221,678,943	295,000,000
McKittrick	83,230,426	11,769,574	95,000,000
Midway-Maricopa	757,050,267	192,949,733	950,000,000
Mountain View	1,138,314	33,861,686	35,000,000
Mount Poso	16,350,265	50,649,735	67,000,000
Round Mountain	4,707,134	35,292,866	40,000,000
Wheeler Ridge	2,989,649	2,010,351	5,000,000
Total Northern	1,780,294,898	2,345,705,102	4,126,000,000

COASTAL FIELDS	Production to July 1, 1934	Estimated Future Prod.	Estimated Ultimate Reserves
Capitan	181,562	11,818,438	12,000,000
Elwood	48,040,080	41,959,920	90,000,000
Rincon	5,582,494	6,417,506	12,000,000
San Miguelito	812,077	24,187,923	25,000,000
Santa Barbara	670,691	1,829,309	2,500,000
Santa Maria	130,489,190	49,510,810	180,000,000
Summerland	3,082,768	417,232	3,500,000
Ventura Avenue	146,636,881	143,363,119	290,000,000
Ventura Newhall	51,747,672	13,252,328	65,000,000
Watsonville, etc.	1,363,143	136,857	1,500,000
Total Coastal	388,606,558	292,893,442	681,500,000
TOTAL STATE	4,162,985,947	3,303,414,053	7,466,400,000

deep zone operations so far have proved disappointing.

Geographically the oil fields in California continue to be limited to three general areas, namely, San Joaquin Valley, coastal area, and Los Angeles basin. It is not a mere matter of either economics or geography which causes the segregation of oil fields into the districts just named. Each district has a more or less definite geological limit, arealy, beyond which the rocks and structure are not such as to offer possibility for oil accumulation.

Wildcatting, in times past, has been more intense in, and on the edges of, these districts than elsewhere. Areas of considerable importance geologically outside of these districts, particularly in northern San Joaquin, the west rim of the Sacramento Valley, and the Coast Range generally, still require study and undoubtedly will be the scene of active wildcatting in the future as they have in the past.

Geological and Wildcat Activity

DISCOVERY of oil is becoming more and more dependent upon improvements in drilling tools and applied geology. With the latter must be classed its aid, geophysics.

As far as geology is concerned there are very few structures left where the dips "sit up and bark at you." Geologists have to study the complexities of structure due to unconformities in stratigraphy and consequent overlaps, perhaps favorable for accumulation. For the drillers, there are few shallow areas to wildcat. Most of the present wildcat drilling and, to an increasing extent, that of the future will be deep; 7,000 to 12,000 ft.

Table 4

Wildcat Activity in California

October 1, 1934

	Major Companies	Small Companies	Total
San Joaquin Valley			
Good	2	0	2
Fair	4	5	9
Poor	3	28	31
Total	9	33	42
Coastal Area			
Good	1	1	2
Fair	2	4	6
Poor	2	22	24
Total	5	27	32
Los Angeles Basin			
Good	0	0	0
Fair	0	4	4
Poor	0	20	20
Total	0	24	24
Total California			
Good	3	1	4
Fair	6	13	19
Poor	5	70	75
Total	14	84	98

California operators are now quite generally using geophysical methods of exploration, particularly seismograph. Used extensively in the Gulf Coast of Texas and the Mid-Continent for a number of years, geophysical methods have indicated numerous structures which subsequent drilling proved to contain oil. In these areas the proportion of discoveries to structures uncovered by geophysics has been less than 50 percent.

At the present time 100 wildcat wells are in various stages of activity in California. This does not include wells being drilled to test deeper sands or to extend proved fields. Eighty-five percent of this drilling is being done by small companies or individuals and less than one-fourth of these wildcat wells are considered to have fair to good chances of success.

Table 4 shows a classification of these activities.

Several years ago the writer prepared some figures which showed that among the 10 largest companies in California, one field was discovered for every 20 wildcats. Along with this the chances of success for the larger companies is considered to be 15 to 20 times greater than that of concerns who put all of their resources into one test. The larger concerns are better equipped for geological exploration and apparently are more selective in their wildcat plays. In the future a greater number of wildcats probably will be drilled for each discovery at greater unit cost.

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Industrial Alcohol and Motor Fuel in Ireland

By George McDonagh

DUBLIN, OCTOBER 2.

OPERATIONS under the Industrial Alcohol Act, 1934 in connection with which a sum of £100,000 was voted by the Dail, are expected to commence within the next couple of months.

The Act empowers the Minister for Industry and Commerce to carry out the experimental development of the industrial alcohol industry.

Potatoes will be the raw material of the industry and it is proposed to erect a group of five distilleries in the extensive potato growing areas of North Louth and Donegal. A refinery will be established in Dublin.

The erection of these distilleries will be undertaken by a firm of engineers which will also operate them.

The annual production of alcohol while the project remains in the experimental stage is expected to amount to between 500,000 and 600,000 gallons absorbing about 25,000 tons of potatoes.

The assumption is that to produce 22 gallons of industrial alcohol it will require 18 cwts. of potatoes with an 18 percent starch content, four cwts. of coal, and six cwts. of barley. It is proposed to pay farmers in the districts mentioned, 35 shillings per ton for their potatoes and it is not expected that any difficulty will be experienced in obtaining them at that price. After all costs of production have been met, the government calculates that it will be able to make industrial alcohol available at 1s. 9d. or 1s. 10d. and certainly not more than 2 shillings per gallon—half of what it has cost in other countries.

On this calculation it is hoped to extend the existing very limited market in the Free State for industrial alcohol. Petroleum importers and refiners will be required under the Act to purchase the bulk of the alcohol to be produced under this experimental scheme and to mix it with imported petrol for use as motor fuel. The mixture will be in the proportion of one part alcohol to ten parts petrol.

The industry has been designed principally as an aid to farmers by providing an outlet for surplus stock of potatoes. It will create but little extra employment.

After this industry—which is of a purely speculative nature—has operated for a couple of years, the government hopes to be able to determine in the light of the results achieved whether it will develop the scheme or abandon it.

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Correction

THE article in the October issue of WORLD PETROLEUM entitled "Will U.S.-S.R. Have Adequate Refining Capacity by 1937" was written by Mr. J. Wegrin, whose name was accidentally omitted from the title.

Another Pipeline for Middle East

One of the welders at work on Anglo-Persian's new pipeline running from Naft-i-Shah to Kermanshah.

WHILE the constructions of the Iraq and Bahrein pipelines were drawing to a close, a third line was commenced in the middle East. This is a 145 mile, three-inch line in Persia from the Naft-i-Shah oilfield to Kermanshah where the Anglo-Persian Oil Co. is erecting a small refinery to meet local demands for petroleum products.

Part of the field was the subject of a pre-war agreement between Persia and Turkey in regard to an exchange of land under which Persia handed over to Turkey an area at Naft Khaneh. After the war, this area, the "transferred territory," became part of the new kingdom of Iraq. Under the terms of the D'Arcy Concession of 1901 the Anglo-Persian Oil Co. had acquired rights over this territory which were safeguarded under the transfer to Turkey and later to Iraq. The company conducted operations and proved the existence of an oilfield on this international frontier, and for this purpose has drilled wells in Persia and in Iraq.

Although the field is being developed as one unit the Iraq section is known as Naft Khaneh and the Persian as Naft-i-Shah. To meet Iraq local requirements a small refinery was erected some years ago by the Khanaqin Oil Company, an Anglo-Persian subsidiary, at Alwand, about 20 miles from the field, and now the Anglo-Persian Oil Co. is erecting a refinery at Kermanshah for the purpose of supplying the increasing requirements of petroleum products to Northern Persia.

The pipe used in the line to Kermanshah has been supplied by Stewarts and Lloyds to A.P.I. Grade B. seamless specification. The line is electrically welded throughout with butt welded lengths and tested to a pressure of 2,300 lbs. per sq. in. Lincoln and Wilson welding machines and "Fleetweld" electrodes are being used on this work.

The line is being laid through very broken country rising from 500 ft. to 5,000 ft. at one point and for this reason most of the trenching has had to be done by hand instead of by trench diggers. The terminus of the line where the refinery is located is at 4,000 ft. elevation. Winter and summer temperatures range from zero to 120 deg. F. Before burying to a depth of two feet the line was wrapped with the Ruberoid Company's "Ruco" felt and coated with bitumen.

There are four pumping stations on the line. No. 1, at the topping plant on the field, will be driven by steam and has three horizontal high pressure reciprocating pumps handling up to 1,500 lbs. pressure. The other three stations are Diesel driven, the pumps being the same as at Naft-i-Shah. The engines, three at each station, were manufactured by the National Gas Engine Company and are 45 b.h.p. each. There are also a number of National Diesel generating sets for lighting and fire extinguishing.

So rough is the country which the line traverses that difficulty was encountered in locating sites for the pumphouses.

The line is expected to be commissioned about midsummer 1935.

British Motor Spirit Price Policy

Independents Hit by Low Values—Ready to Abandon Market Emphasizing The Value of Established Companies Whose Operations May be Counted on to Continue With or Without Profit.

EXPERIENCE in the British market during the past six months has demonstrated the vulnerability of the independent distributor of motor spirit to a low range of prices.

By their reduction of 1d., bringing the price of first grade spirit down to 1s. 5d. per gallon as from March 22, the "national" distributing companies managed to establish a price level which just enabled the most efficient distributors to earn small profits, and at the same time put a severe check on the operations of the small unaffiliated distributors operating outside the orbit of the "national" group.

Operations of these concerns were largely responsible for the March cut in motor spirit values, but the bulk prices at which the national companies have been dealing subsequently has left the outside firms practically no margin beyond that required for wagon hire and wages. The casual distribution of motor spirit in the British market thus ceased to be a profit earning proposition.

Although they had to work without any appreciable profit, the majority of small independent distributors continued to supply their customers in the hope of an improvement in market conditions. Experience of previous periods of low prices had taught them that British prices never remain at unremunerative levels for long without a movement among the combine companies for a higher range of values. The independents therefore hoped for an improvement in the quotations of the national group or a downward turn in international oil prices, either of which would have put them on a profitable basis again.

Meanwhile, they felt the pinch of the March reduction in motor spirit prices very severely. Conclusive evidence of this is provided by the fact that a high official of at least one leading company has been approached by some of the independents with a tentative suggestion of some form of sales co-operation. This suggestion was turned down as a matter of course, and only needs to be recorded as a sign of the weakness of outside distributors.

This evidence of difficulty faced by independent operators in the motor spirit distributing market suggests that the soundest policy for the national group is to keep the market closely adjusted to international conditions. Distributing in Great Britain during the past six months cannot be considered remunerative by any stretch of imagination, and the maintenance of relatively low selling values entails a sacrifice of reasonable profits which might otherwise be earned by members of the national group. But if persisted in, it would force many independents out of business, with the loss of their trade connections and possibly the non-fulfilment of contracts. It would thus rob many of the smaller independent distributors of any trade goodwill they possess, and would make it correspondingly difficult for them to get business back when the distributing margin is again restored.

Action on these lines by the national companies would be perfectly logical, since it would, if successful, demonstrate the outstanding difference between the permanent and the casual seller of petroleum products. The national companies, with one or two big outside distributors, combine the continuous supply of consistently high grade products with extensive organizations for the service of retail dealers. They may, in fact, almost be said to have "spoilt" their customers by over-attention. The smaller outside concerns, on the other hand, do nothing more than sell so much oil of unspecified quality at a given price as and when it suits them, and the temporary disappearance of some of them would throw into relief one of the principal advantages offered by the big distributors to their customers in the British market.

It is too much to hope that, by keeping prices down, the national companies can permanently eliminate outside distributors from the market while world oil supplies are excessive. Any approach to more profitable conditions would be certain to bring moribund independent concerns back into the market, with a fresh struggle for business and a fresh depressing influence on the price level. A more permanent solution of this problem will have to be sought in an adjustment of oil supplies to world requirements.

It is the arrival in British ports of cheap cargoes, resulting from overproduction, which has thus far enabled the independent distributor to operate on a scale sufficient to worry the national companies and keep selling prices down. The British market is thus largely dependent on the establishment of effective control of the United States industry, which would undoubtedly be followed by improvement in export markets, the rationalization of European supplies, and more remunerative selling prices in Britain.

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British Imports

DURING September the rate of British imports of petroleum and products declined sharply as a result of an unusually heavy decline in the consumption of motor fuel. Lubricating oil imports were also lower due probably to the fact that smaller shipments of this product arrived from Russia and America during the month. Fuel oil imports were, however, well maintained indicating continued industrial expansion.

British Imports by Products

Barrels

	September 1934	Nine months to September 30, 1934	Nine months to September 30, 1933
Lamp oil	367,438	4,449,782	3,690,254
Motor spirit	2,326,086	24,208,713	24,246,103
Lubricating oil	214,314	2,337,314	2,185,486
Gas oil	155,428	2,876,999	2,423,595
Fuel oil	1,618,305	13,516,392	11,651,902
Other sorts	43,800	459,314	334,430
Total products	4,725,371	47,848,514	44,531,770
Crude	1,225,457	10,771,399	8,396,739
Total imports	5,950,828	58,619,913	52,928,509

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World Oil Production—Official Figures for 1934 Revised

All figures furnished direct to WORLD PETROLEUM by Governments, except where otherwise specified

(Figures in U. S. Barrels—Conversion ratio 7 bbl. = 1 ton)

Country	September 1933	October 1933	November 1933	December 1933	January 1934	February 1934	March 1934	April 1934	May 1934	June 1934	July 1934	August 1934
United States	78,186,000	76,017,000	69,755,000	72,060,000	71,976,000	65,450,000	75,548,000	75,796,000	79,870,000	80,040,000	81,548,000	79,058,000
Russia	14,340,200	14,595,000	13,479,200	12,591,600	13,356,000	12,488,900	14,644,000	14,081,900	14,315,000	13,966,400	14,297,500	14,287,700
Venezuela	10,231,410	10,852,653	10,843,910	11,253,704	11,091,415	9,921,765	11,238,717	11,185,076	11,768,799	12,500,307	12,193,307	12,505,304
Roumania	4,420,486	4,502,127	4,000,000	4,515,000	4,906,000	4,440,000	5,066,000	4,981,000	5,258,000	5,228,000	5,223,000	5,556,000
Persia[2]	4,109,000	4,549,867	4,199,797	4,422,096	4,164,790	3,988,502	4,483,535	4,284,231	4,648,105	4,399,045	4,577,251	4,886,462
Mexico	2,605,840	2,429,072	2,833,630	3,259,258	3,113,707	2,863,088	3,183,923	3,206,490	2,714,828	2,918,793	3,303,055	3,433,265
Netherland India	3,186,435	3,179,043	3,127,047	3,414,754	3,376,674	3,185,091	3,631,726	3,489,024	3,609,816	3,577,056	3,678,745	3,410,785
Colombia[1]	1,085,885	1,087,397	999,253	995,605	1,012,780	903,471	1,017,147	1,193,736	1,730,093	1,683,691	1,646,739	1,691,314
Argentina	1,098,008	1,146,392	1,296,166	1,216,461	1,241,591	1,111,358	1,231,978	1,128,922	1,029,074	1,096,855	1,077,502	1,075,000[1]
Peru[4]	1,035,338	970,427	998,066	1,178,004	1,188,540	1,041,658	1,086,827	1,037,127	1,085,192	1,187,030	1,233,804	1,300,253
Trinidad	755,676	818,184	788,970	799,484	852,189	766,254	876,544	876,950	926,785	947,122	1,008,669	975,697
British India	773,440	680,880	667,719	701,478	782,743	699,369	808,647	759,977	796,208	749,294	700,000[1]	700,000[1]
Poland	315,000	312,956	309,624	311,500	312,333	281,946	310,860	304,500	305,592	304,437	315,861	320,145
Sarawak	182,602	186,431	179,648	176,008	172,172	158,361	176,568	166,999	166,565	158,669	164,206[1]	160,000[1]
Japan and Taiwan[1]	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000	195,000
Egypt	133,903	125,786	128,450	127,421	122,934	109,900[1]	121,121	117,236	130,851	132,097	135,156	135,000[1]
Ecuador	139,826	141,379	133,591	138,198	132,653	120,900	131,566	135,226	142,869	158,826	141,474	140,944
Canada	97,342	97,132	108,304	113,677	124,423	116,546	130,046	118,890	117,693	109,021	120,772	114,778
Germany[3]	155,778	160,951	157,808	155,491	152,292	138,593	159,096	176,071	159,103	179,480	208,145	191,366
Iraq[1]	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
France[1]	46,000	46,000	46,000	46,000	46,000	46,000	46,000	46,000	46,000	46,000	46,000	46,000
Others[1]	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000
Total	123,229,169	122,229,677	114,383,183	117,806,739	118,456,339	108,162,702	124,223,241	123,416,355	129,151,575	129,713,123	131,950,186	130,319,013

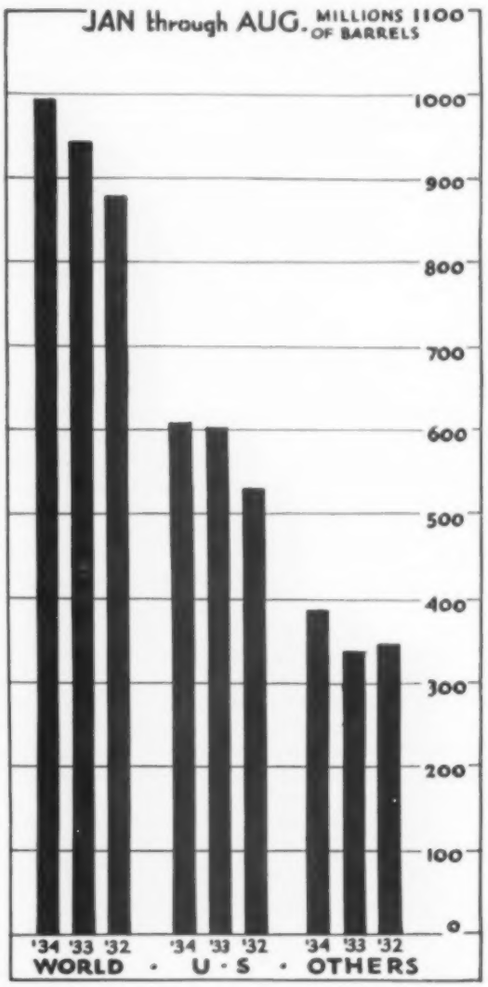
[1] Estimate. [2] Anglo-Persian Oil Co. figures revised; fuel oil returned to the ground has been deducted. [3] Thuringia estimated 7,000 bbl.; official figure for Prussia. Sakhalin Russian included with Russia. Sakhalin Japanese included with Japan. [4] International Petroleum Company's figures.

Official Crude Oil Production Figures for 1932, 1933 and First 8 months of 1934

(Barrels of 42 U. S. Gals.)

	Total 1932	Daily Average 1932	Total 1933	Daily Average 1933	Total 1934	Daily Average 1934
United States	785,159,000	2,145,243	898,874,000	2,462,670	609,286,000	2,538,691
Russia	149,719,000	409,070	149,901,900	407,950	111,437,400	464,322
Venezuela	119,596,512	326,766	120,882,802	331,186	92,404,789	385,019
Roumania	50,491,285	137,954	50,971,200	139,647	40,658,000	169,408
Persia	45,122,455	123,285	49,581,280	135,840	35,431,921	147,633
Mexico	32,802,285	89,624	33,904,882	92,890	24,737,149	103,071
Netherland India	39,584,027	108,153	38,512,663	105,516	28,004,347	116,684
Colombia	16,384,956	44,768	13,157,127	36,047	10,878,973	45,329
Argentina	13,166,900	35,975	13,759,565	38,232	8,992,280	37,467
Peru	9,899,266	26,026	13,923,281	38,146	9,160,431	38,168
Trinidad	10,023,780	27,387	9,560,039	26,192	7,230,210	30,125
British India	8,600,312	23,500	8,721,665	23,893	5,996,238	24,676
Poland	3,905,230	10,670	3,858,085	10,570	2,455,614	10,231
Sarawak	2,274,043	6,213	2,289,472	6,273	1,319,334	5,497
Japan and Taiwan	2,340,000	6,393	2,340,000	6,411	1,560,000	6,500
Egypt	1,742,370	4,760	1,591,495	4,360	1,004,295	4,184
Ecuador	1,573,857	4,300	1,622,624	4,446	1,104,460	4,601
Canada	1,054,373	2,880	1,147,825	3,144	952,171	3,977
Germany	1,824,019	4,983	1,712,823	4,692	1,392,741	5,803
Iraq	1,200,000	3,300	1,200,000	3,288	800,000	3,333
France	552,000	1,508	552,000	1,515	368,000	1,533
Others	432,000	1,180	432,000	1,184	288,000	1,200
Total	1,297,477,590	3,544,940	1,418,274,794	3,884,022	995,462,353	4,147,760

Comparison of crude oil production in the United States, all other countries and total for the world during January through August, 1932, 1933 and 1934.



Foreign Oil Legion

F. S. FALES is the new Treasurer of the Socony-Vacuum Oil Company, Inc., succeeding Mr. Richard P. Tinsley who recently retired after 42 years of service.

Mr. Fales, the newly elected Treasurer, has been identified with the company for 31 years. He joined the Standard Oil Company in 1903 as Assistant Manager of the Manufacturing Department. In 1919 he was elected Director and also President of the Standard Transportation

F. S. Fales.

Company, a subsidiary in charge of the marine operations of this company. In 1932 he became President of the Standard Oil Company of New York, and following the merger with the Vacuum Oil Company, became Vice-President and a Director of Socony-Vacuum. Mr. Fales is also a member of the Executive Committee.

SECRETARY of the Interior Harold L. Ickes, the Oil Administrator, recently announced the appointment of Ralph Horween of Chicago as Executive Assistant for Oil. Mr. Horween, before he was appointed Executive Assistant to the Oil Administrator, had served as Chief of the Chicago Office of the Petroleum Administrative Board.

Mr. Horween attended Harvard University and during the world war he was a lieutenant on active duty, serving aboard a destroyer in the Mediterranean and Black Seas. Prior to his appointment last January as an Attorney for the Petroleum Administrative Board he practiced law in Chicago, Illinois.

ANNOUNCEMENT has been made that the General Reception and Arrangements Committee of 300 leading New York business men, of which Herbert L. Pratt, chairman of the Board of the Socony-Vacuum Oil Company, is chairman, has organized a most interesting program for the coming National Foreign Trade Convention, which will be held at the Hotel Commodore in New York City on October 31, November 1 and 2.

John Skliros shaking hands with Sir John Cadman as the chairman of the Anglo-Persian Oil Company leaves England for a trip to Australia. Duncan Anderson may be seen between Sir John and Mr. Skliros. L. M. Lefroy is standing to the right of Sir John with papers under his arm and N. A. Gass may be seen between Sir John and Mr. Lefroy.

Fred L. Convers.

FRED L. CONVERS, Vice President, Continental Emsco Co. Inc. sailed from New York October 19 on the SS. BREMEN on a trip to Roumania. Mr. Convers will probably examine the Roumanian well that is drilling below 11,000 ft. at present, as his company is well known for the manufacture of deep well drilling equipment. Mr. Convers expects to return to New York December 15.

F. R. MARKLEY, manager, overseas sales department, Sun Oil Company, Philadelphia, is travelling in Europe on business, and is expected back in America early in November.

Gulf Export Prices for Major Oil Products

Product		Cents per Gallon			
		Sept. 15	Sept. 25	Oct. 5	Oct. 15
Gasoline:	U. S. Motor	4¼	4⅜	4⅜	3¾
	64/66–375 E. P.	4¾	4¾	4¾	4⅜
	59 Oct. & below	5	5	4¾	4½
	65 Oct. & above	5½	5½	5¼	5
Aviation Gasoline:	73 Oct. & above	10½	10½	10½	10½
Kerosene:	44 w.w.	4¼	4¼	4¼	4¼
	41–43 w.w.	4⅛	4⅛	4	4
	41–43 p.w.	4	3⅞	3⅞	3¾
Gasoil:	26–30 translusc.	3⅛	3¼	3¼	3¼
	30 plus translusc.	3½	3½	3½	3½
Fuel Oil:	Bunker purposes (per bbl.)	$1.15	$1.15	$1.00	$1.00
Grade C:	Cargo lots (per bbl.)	$ .80	$ .75	$ .75	$ .75
	Diesel oil (per bbl.)	$1.80	$1.80	$1.70	$1.70
Lubricating Oil:	Bright Stock No. 8	27½	27	27	27
(New York Export	Bright Stock No. 6½	26½	26	26	26
Market)	Warren E.	22¼	22½	22½	22½
	600 Unfilt.	19¼	18½	18	18
	650 Unfilt.	21¾	21	20	20
	600 Flash s.r.	22¾	22	21	21
	630 Flash s.r.	26	25	25	25
	Neutral 200 No. 3	34½	34½	34½	34½
	Neutral 150 No. 3½	28	28	28	28
	300 No. 3 pale	7	7	7	7
	500 3½ pale	7⅞	7⅞	7⅞	7⅞
	750 4 pale	8¾	8¾	8¾	8¾
So. Texas	1200 4 pale	9¼	9¼	9¼	9¼
	500 No. 5–6 red	7⅞	7⅞	7⅞	7⅞
	750 5–6 red	9	9	9	9
	1200 5–6 red	9¼	9¼	9¼	9¼

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U. S. S. R.

Official Figures for Soviet Oil Operations

Month	Crude Production (bbl.)	Daily Average (bbl.)	Run to Stills (bbl.)	Drilling (feet)
January	13,356,000	430,840	11,680,000	317,011
February	12,488,000	446,000	10,621,800	321,509
March	14,644,000	472,000	12,257,000	360,096
April	14,081,000	469,397	12,637,100	353,311
May	14,315,000	461,774	13,101,900	384,793
June	13,966,000	465,546	12,363,400	385,387
July	14,297,000	461,210	12,744,900	402,267
August	14,287,700	460,893	12,693,200	353,099
September	13,924,400	464,147	11,969,300	318,123
Total 9 months 1934	125,369,100	459,227	110,068,600	3,195,596
Total 9 months 1933	109,161,300	400,221	107,708,100	1,953,676
Total 1933	149,901,900	407,950	131,591,300	2,789,253
Quota 1933	170,800,000	467,670	135,000,000	3,315,000
Quota 1934	214,900,000	588,876	161,000,000	4,950,000
Possible Production 1934	175,000,000	470,000	152,000,000	4,000,000

Crude conversion: one ton=seven bbl.

SEPTEMBER crude oil production in the U.S.S.R. dropped from an average of 463,680 bbl. per day for all Soviet oil fields during the first half of the month to 458,400 bbl. per day during the second half of the month or actually below the corresponding figure for last year. The arrears against plan for crude production for all Soviet oil fields during the nine months past aggregate about 34,000,000 bbl. of which about 12,000,000 bbl. are arrears of Baku. While the general increase over last year is 17 percent, the arrears of the plan for this year are about 20 percent. With the exception of Baku and Maikop all Soviet oil fields show not only arrears of the plan for the year but also arrears against last year's operations.

Petroleum Exports from U. S. S. R.

(Tons)

	July 1934	Seven Months 1934
Crude	28,852	133,493
Gasoline	75,931	736,213
Kerosene	27,953	241,726
Gas oil	32,154	349,949
Fuel and Diesel	143,918	835,198
Lubricating oil	27,216	150,062
Other products	3,421	28,857
Total	339,445	2,475,498

From the accompanying tabulation it appears that a remarkable improvement over last year's crude production has become stabilized during the past six months. It is unlikely that any reversal will take place during the remaining three months of the year, unless a number of unusually prolific gushers come in as was the case during the second half of last year. At this time of the year Russian roads around the oil fields become almost impassable, the fields themselves practically inaccessible and all operations very difficult. Of course, improvements are not excluded, but they are bound to bring moderate increases and it is unlikely that our forecast of 175,000,000 bbl. of crude production in 1934 will be exceeded.

It appears also that crude production in 1934 will be sufficient to meet the demands for internal consumption and exports and possibly leave some balance in storage, but the slow rate of progress during the year will become more noticeable during the next and following years when domestic consumption begins to grow immensely as a result of general industrialization of the country and mechanization of agriculture.

	Domestic Consumption (Barrels)	Exports (Barrels)
1933	92,820,000	33,600,000
1934	108,000,000	35,000,000
1935 (planned)	130,000,000	43,000,000

Baku Prepares for Winter

BAKU continues to experience difficulties owing to lack of supplies. The main suppliers of equipment and tools are retarding delivery and are not cooperating with the oil industry. The situation is grave in regard to the supply of pipe. Of a total of 22,600 tons of pipe for casing which the steel mills had to deliver during the three months, July to September, only 9,400 tons were shipped. The Mariupol and Taganrog Works have shipped only about 36 percent of the required quantities while the Andreef plant has shipped only about 12 percent of the required quantity of drilling pipe

and have been entirely unable to supply 5 and 10 inch pipe. Lack of casing and drilling pipe at Baku has retarded operations and a number of newly completed wells could not come under operation owing to lack of pipe. The general drilling index per month has dropped from 2,193 meters in July to 1,500 meters in August and only 49 new wells started drilling during August as against 70 wells expected. Of the 97 wells expected to be completed in August only 60 were completed. Such pipe as is furnished is of low quality. Welded pipe is being delivered in place of seamless pipe and the welding is so defective that it gives in while being transported to the fields. Delivery of sheet metal is another weak point. Twenty-eight percent of the required quantities was delivered during the second quarter and no improvement is being promised for the future. Of 1,000 tons of sheet metal allotted to Baku only 102 tons were delivered. The Stalingrad Works, the "Red October" plant, the Southern Djerzinski Works as well as the Petrovski, Rikoff and Frunze Works have flatly refused to ship any sheet metal for the oil industry, despite the fact that filling an order for 1,000 tons of sheet metal would engage these works for but a few hours. Lack of timber is enhancing the hardship of the oil fields. No stocks of timber have been prepared for the winter months, and now the navigation season is nearing an end and the timber trust has failed to make any delivery whatsoever.

Several gushers came in during the month in the Mikoyan (Lokbatan) and other fields of Baku yielding in the average between 1,400 and 1,750 bbl. of crude per day. Elsewhere in Baku gushers came in flowing under immense gas pressure from the VIII oil horizon which is identical with the so called Upper Kirmakin layer of the old oil fields. On several occasions the operators were unable to cope with the gas pressure. At the Kaganovitch group of fields a 7,000 bbl. well came in from the IX horizon. At the extreme tip of Artema island a well came in flowing 1,000 bbl. of crude per day. There are indications that the oil sands extend further under the sea bed and drilling at sea bottom will be started shortly.

Grozni Operations

SEVERAL gushers were brought in at Grozni during July and August, together with new wells in the October region, where the "Podnadvig" has been opened and the new discoveries at Molgabek show that the entire chain of Chechensk mountains are oil bearing lands. The theory of "exhaustion" of Grozni has been crushed. The oil operators of Grozni have changed their sceptical attitude to a feeling of confidence. However Grozni is still far behind plans and continues to keep on a downward trend. Grozni arrears continue to be due largely to defects of organization.

The management of Grozni attributes the shortcomings to inadequate supplies which have handicapped development of new oil regions and of deeper horizons in the old oil fields.

The quantity of material supplied to Grozni is far from being satisfactory. Lack of cement has been felt in the swabbing and capping of wells and many of the complaints in regard to lack of timber, metals, non-ferrous alloys, pipe and tools are fully justified. Insufficient supply of all kind of heavy equipment is seriously interfering with plans and schedules for completion of wells. While the complaints are justified it is also true that Grozni has not been able to utilize effectively all the materials and resources which have been placed at her disposal.

Considerable progress has been made in the quality of drilling. The average speed per table per month has increased from 460 ft. in 1933 to over 700 ft. at present, but progress on individual locations has never been made the subject of a study in general and therefore the experience of practical drillers has never become available to Grozni operators. By failure to take advantage of such practical experience, Grozni is losing an excellent opportunity.

Complaints have been made that the planning division of the Grozni main office does not employ any practical oil men.

The oil college of Grozni has defects. The qualifications of its drilling graduates are poor. Several new appointees after graduation from the Grozni oil college had to be employed otherwise than as drillers. One of the old Grozni field men recently stated that none of the newly graduated drilling engineers have sufficient qualification to be entrusted with any responsible job. Any "old timer" without the new technical education knows more than several new college graduates of Grozni put together.

The tectonic structures at Grozni are of a very complicated nature and require special geological attention. There seem to be no geologists to take care of the jobs and the very few available geologists are recent graduates with very limited practical experience.

The management of Grozni has often admitted that the problem of a personnel is closely connected with the problem of housing and supply of commodities. So far, however, only the needs of management have been taken care of, while the technical forces and other personnel are reported to be overlooked.

Mr. Ordzonikidze, while in Grozni noted the shabbiness of dress of the entire technical personnel and has ordered a general shake up in this direction. But some difficulty may be experienced in complying with this order when all shops cooperative and communal have nothing but empty shelves. No shoes, no clothing, not even a shirt is to be had and this is also true in the division of the store assigned to supply the management.

Other Oil Fields

THE RAILROAD between Ufa and Ishimbayevo has been completed and the first train consisting of tank cars loaded with crude from Ishimbayevo oil field has left for Ufa. The railroad is 177 kilometers long and together with all auxiliary lines has a total distance of 194 kilometers. Thus the Ishimbayevo oil field has been opened for commercial production. At present 22 wells are drilling of which 12 wells are expected to yield 7,000 bbl. of crude per day during the fourth quarter of this year. Ishimbayevo oil field will also have about seven kilometers of gathering pipelines from the wells to a tank farm with 15 storage tanks. The Ishimbayevo field will shortly be extended to Kuspiakulovsk which is about four kilometers from the present field and to Allaguvatovo which is about six kilometers from Ishimbayevo. Both extensions, however, will require deep drilling. At present the supplies of equipment for Ishimbayevo are insufficient. A number of wells lack pipe, centrifugal pumps, sheet metal and other materials and operations are therefore slow. However, when these difficulties are overcome, Ishimbayevo is bound to become an important oil field.

The first well of this new oil field at Perm Bumkombinate has been completed, swabbed and tested. This field which is an extension of Upper Chussovo will have four more wells sunk during 1934. New extensions at Levshino, Gubakha and Cherdin are at present under exploration by two geological expeditions which are making topographical and graviometric studies.

Another geological expedition in the Khaudag oil region is exploring the left bank of Sukhan Darji and is making steady progress. Three oil structures have been discovered over an area of 80 kilometers. The productive layer appears to be situated 3,500 ft. deep and stretches over a width of 3,000 ft. Middleasia oil trust will begin commercial production early in 1935.

Patches of oil on the surface were found in the region of Kassan Saisk, Ferghana Valley. The Middleasia Research Institute has collected some data from which conclusions were reached that the oil structures of this region are situated at considerable depth and are badly faulted.

Soviet Deep Drilling

DURING 1934 a total of eight deep wells were sunk in the Emba oil fields. Two of the wells reached 8,650 ft. of the projected 10,000 ft. The other six wells were planned for 8,250 ft. Up to the present all drilling in Soviet Russia averaged 3,500 to 4,500 ft. and it is evident that lack of experience in deep drilling is hampering progress. The first deep well started at Emba has taken about two years to

Comparative Quarterly Figures for 1934 and 1933

	Crude Production (bbl.)	Daily Average (bbl.)	Run to Stills (bbl.)	Drilling (feet)
First quarter 1934	40,488,900	449,876	34,559,700	998,616
First quarter 1933	32,473,700	360,820	29,632,100	555,416
Second quarter 1934	42,362,000	465,506	38,102,400	1,123,491
Second quarter 1933	37,108,400	384,431	33,999,300	641,263
Third quarter 1934	42,935,000	466,620	38,000,100	1,140,600
Third quarter 1933	39,579,200	400,221	34,066,700	756,997

drill to 2,000 ft. and at this depth it takes about 20 hours to lift tools.

At a conference of representatives of the heavy industries, including the oil industry, held at Moscow at the end of September, Mr. Rukhimovitch, Vice Comissar for Heavy Industries, stated that a month's stay at Baku and Grozni to investigate working conditions had convinced him that entirely new methods for drilling will have to be introduced in Soviet fields and the operations have to be done in a different way from before. Deep drilling has become the most vital necessity for all oil fields and this will require high quality equipment and pipe, preventors, heavy duty pumps, precision measuring instruments and four speed hoists. At present the best that can be expected is that the domestic machine shops will be able to supply high quality pipe by 1935.

It has been found necessary to tell the drillers that in order to attain quality they must take care of the equipment. The oil fields of Baku, Grozni and Maikop need caterpillar tractors, hoists and trucks, but what happens to all this equipment when it is delivered; no effort is made to take proper care of equipment.

Mr. Riabovol, head of Grozni, pointed out to the Conference that Grozni is far behind schedule and owing to the high gasoline contents of Grozni crude the losses implied are evident. The causes of Grozni shortcomings are to be found in defects of organization and in geological difficulties. J. WEGRIN

▼

UNITED STATES

	Daily Crude Oil Production Bbl.	Daily Runs to Stills Bbl.	Total Motor Fuel Stocks Bbl.	Imports for week Bbl.	California Shipments East for week Bbl.
Week ending Sept. 29	2,502,500 527,000*	2,320,000	53,145,000	971,000	452,000
Week ending Oct. 6	2,468,000 529,500*	2,255,000	52,515,000	624,000	297,000
Week ending Oct. 13	2,549,000 530,500*	2,438,000	52,285,000	1,144,000	415,000

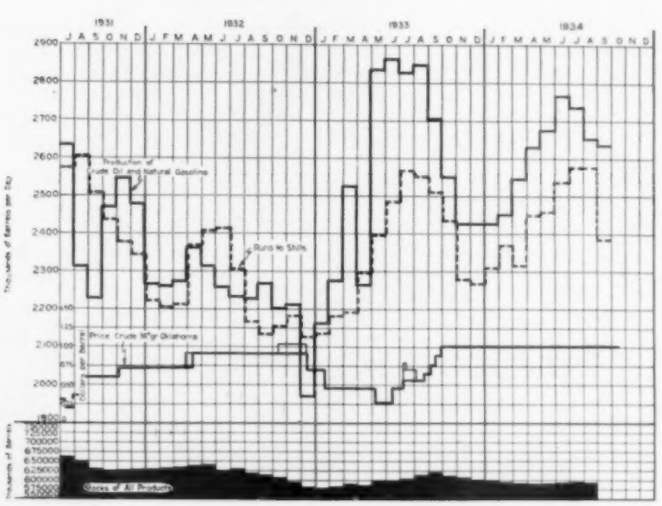
Underlined figures indicate improvement in statistical position—decrease in production, runs to stills, gasoline stocks and imports.
* Estimated total production of the Rusk-Gregg field, East Texas; official and unreported.

Adverse Court Decisions

FEDERAL control administration during September and early October assumed an entirely passive rôle, and beyond conferences in Washington, D. C., with the Planning and Coordination Committee and in Chicago with refiners, nothing constructive was done.

Court decisions were unfavorable to the NRA, influenced unquestionably in part by changing public attitude towards strict government supervision of private enterprises. On September 22 Federal District Judge Edgar S. Vaught in Oklahoma City held unconstitutional the "orderly development" of new oil fields clause of the Petroleum Code in the Eason Crescent case, as was reported in the preceding issue of WORLD PETROLEUM, and as was repeatedly indicated the court would rule. In fact, it becomes more and more apparent that almost all credit for semblance of order in the oil industry during the past year of $1.00 crude oil is due to major oil companies and some independents in operating under various regulations, while realizing that most of the orders would be held unconstitutional. In the Eason case decision Judge Vaught stated: "This court is of the opinion that that portion of the code which is involved in this case was not even authorized or contemplated by the act of Congress and would be clearly unconstitutional if it had been, and is therefore merely an unauthorized order of the Secretary of the Interior. If Congress can regulate and control the production of oil and gas wholly within a state, it can regulate and control any other private intrastate business, and the

U. S. production, runs to stills and price of crude oil in relation to stocks of all petroleum products.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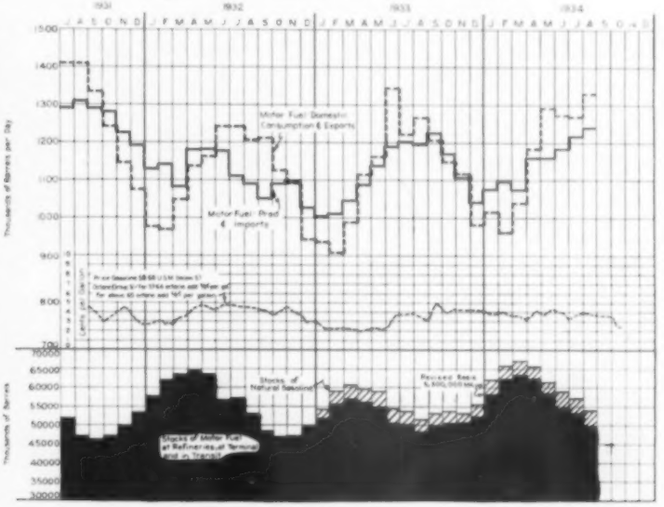
Production of Crude Oil and Natural Gasoline
Runs to Stills
Price Crude 36° at Oklahoma
Stocks of All Products

U. S. consumption and exports, production, imports and prices of motor fuel in relation to motor fuel stocks.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Motor Fuel Domestic Consumption & Exports
Motor Fuel Prod. & Imports
Stocks of Natural Gasoline

rights of the state therefore recognized by the Constitution and by our highest court will be entirely destroyed. . . ." It is considered highly improbable that the government will appeal the case.

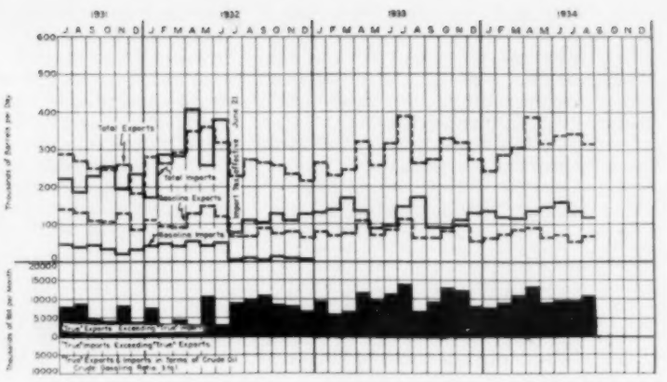
Another amazing development occurred late in September when James Crawford Biggs, Solicitor General in Washington, requested the United States Supreme Court to dismiss the government's case against J. W. Smith and four other Texas operators charged with overproduction on the ground that President Roosevelt's executive order on oil production, as signed, omitted by oversight the mention of the offense charged. The omission referred to is the last paragraph of Section 4, Article III, reading: "If any subdivision into quotas of production allocated to any state shall be made with a state, any production by any person, as person is defined in Article I, Section 3, of this Code, in excess of any such quota assigned to him shall be deemed an unfair trade practice and in violation of this Code." President Roosevelt corrected the mistake on September 25 and federal agents were reported to be active again in the East Texas field gathering information on violations of production quotas since that date.

On October 9 officials of the Oil Administration and of the Department of Justice secured from the United States District Judge P. Forman in Trenton, N. J., temporary orders restraining action on two cargoes of gasoline brought by SS. PHOENIX to Bayonne and by SS. PUEBLO to Carteret, N. J., though both tankers were permitted to unload, but the gasoline was to remain sealed. The Petroleum Administrator's office claimed that both tankers brought gasoline which appeared to have been made from illegal crude oil. On October 17, however, Judge Forman handed down an opinion denying the petition of United States Attorney for a permanent injunction against the entry of the two shipments, and granted the motions of the defendants for dissolution of the temporary restraining orders.

The United States Supreme Court agreed to review lower court decision on the constitutionality of the oil production control provisions of the NIRA, as challenged by Amazon Petroleum Corporation and the Panama Refining Company, both operating in the East Texas field, where the United States District Court ruled against the government but which decision was subsequently reversed by the Fifth Circuit Court of Appeals in New Orleans. The Amazon Panama case assails the constitutionality of Section 9-C of the NIRA and the Oil Code, and the oversight previously referred to does not affect this case in any manner.

By the middle of October it appeared most probable that Secretary Ickes would abandon attempts to control production, leaving that problem to the state agencies, and will concentrate on curbing shipments of illegally produced crude oil in the interstate commerce. Also a concerted effort will be made to revive and pass an Oil Control Bill in the next Congress. An active campaign is, however, now under way against any new federal oil legislation, and the candidates for governors in Texas, California and Oklahoma expressed themselves definitely for state control measures.

Total U. S. imports and exports and gasoline imports and exports in relation to true exports exceeding true imports.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Total Exports
Total Imports
Gasoline Exports
Gasoline Imports
Thousands of Barrels per Day
Thousands of Bbl. per Month
"True" Imports Exceeding "True" Exports
"True" Exports Exceeding "True" Imports

Gasoline Purchase Plans

THE GASOLINE purchase plan of "distress" gasoline approved on September 10 by Secretary Ickes collapsed entirely when the East Texas illegal crude oil production increased to over 120,000 bbl. per day. While the industry was apparently willing to absorb up to 60,000 bbl. of "hot" oil per day, or about 20,000 bbl. of gasoline, it was found impossible to combat the influence of 120,000 bbl. of cheap crude oil which flooded the markets with 40,000 bbl., 1,680,000 gallons, of gasoline per day.

Vertical Unionism Adopted by A.F.L.

THE American Federation of Labor at its Convention in San Francisco voted on October 11 definitely to change its structure and policies, deciding that mass production industries shall be organized along industrial or vertical lines rather than on craft or horizontal lines. Automobile, cement and aluminum industries were to be affected first, and probably the change will eventually apply to the oil industry. The change in this basic policy will greatly strengthen the union cause within industries.

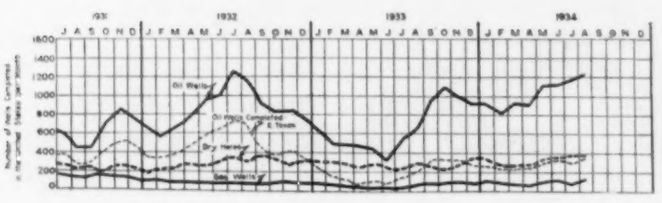
Imports and Exports

DURING August, 1934, total imports of all petroleum products into the United States further declined to 3,561,000 bbl., 115,000 bbl. per day, as compared with 4,101,000 bbl., 132,250 bbl. per day, imported during the preceding month, and 4,712,000 bbl., 157,100 bbl. per day brought in, in June, 1934.

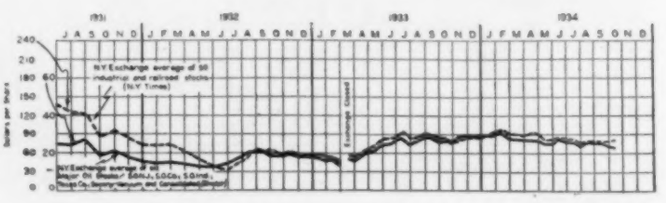
It has been brought to our attention that total import figures as given in WORLD PETROLEUM were not entirely clear to some of our readers in their relationship to federal import quotas inasmuch as bonded and non-dutiable imports were not separated. In fact, under the federal quota the imports are limited to 108,400 bbl. per day, and while total apparent imports during August, 1934, exceeded the quota by 6,600 bbl. per day, the "true" imports, excluding bonded non-dutiable imports for refining and export or for supply of vessels, averaged 20,700 bbl. under allowable, 451,695 bbl. of crude oil and 971,387 bbl. of refined products having been brought into United States in transit. Similarly while total imports into United States in the September, 1933–August, 1934 restricted one-year period, inclusive, averaged 123,800 bbl. per day, thus apparently exceeding the quota by 15,400 bbl. per day and by 5,620,000 bbl. over the whole year, "true" imports, as defined above, averaged 102,200 bbl. per day over the past year, therefore being 6,200 bbl. per day and 2,263,000 bbl. for the restricted period under the federal quota. The reports of the Department of Commerce indicate that 1,650,961 bbl. of crude oil and 6,240,657 bbl. of refined products entered United States during the past year in bond.

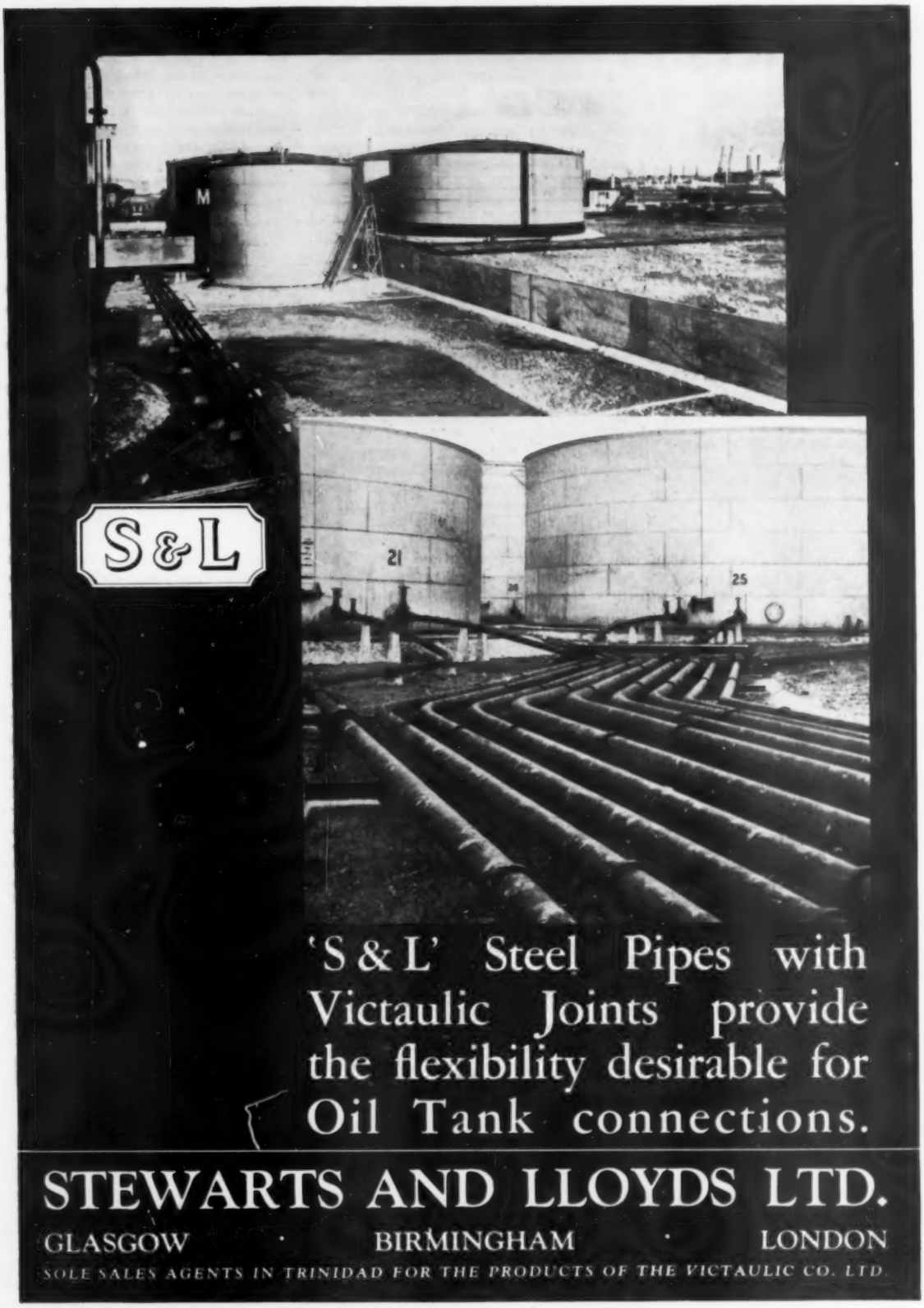
(Continued on page 438)

U. S. drilling; comparison of oil wells, dry holes, and gas wells.



Six major oil stocks in relation to 50 industrial stocks on the New York Stock Exchange.

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Exports of all petroleum products, including motor fuel, in August, 1934, declined slightly to 9,640,000 bbl., 311,000 bbl. per day, as compared with 10,271,000 bbl., 331,000 bbl. per day, shipped during July, 1934; but were 17.73 percent above total exports in August of 1933. Motor fuel exports during August, 1934, amounted to 2,169,000 bbl., as compared with 1,717,000 bbl. exported in July of 1934, an increase of 26.35 percent; and were 10.60 percent above motor fuel exports in August of 1933. Exports of crude oil from the United States declined somewhat to 3,696,000 bbl. in August, 1934, as compared with 4,128,000 bbl. exported in the preceding month; and 3,141,000 bbl. shipped during August of 1933. Therefore in August, 1934, crude oil constituted 38.35 percent of the total exports of all petroleum products.

Following President Roosevelt's speech early in October advocating gradually higher price level and anticipating further inflation of American currency the U. S. dollar declined to 99.58 percent of its new parity in terms of francs on the foreign exchange markets, but subsequently recovered part of the ground lost when more conservative interpretation was given to the President's views. At this writing it does not appear probable that further inflation will be undertaken in the immediate future, though if business in the United States fails to recover during the coming winter currency experiments undoubtedly will be resumed.

The expected immediate reduction in crude oil prices in the Mid-Continent to about 70 cents per barrel (41.3 cents gold*) will result in a large increase in exports of crude oil, more particularly to countries such as Japan, storing it in great volume, both as a measure of national defense and in preparation of extensive refinery building plans.

Crude Overproduced

CRUDE oil and natural gasoline production during September, 1934, averaged about 2,630,000 bbl. per day, 22,000 bbl. per day below the preceding month when the average production was 2,652,000 bbl. per day; and also 74,000 bbl. per day below the crude oil and natural gasoline production in September of 1933, the month in which the East Texas situation was brought under control after overproducing by large margins in the May–August, 1933, four-month period. The September, 1934, crude oil production therefore exceeded the federal allowable by 188,000 bbl. per day, and early in October the overproduction soared to 223,000 bbl. per day with East Texas field contributing most of the excess production. An interesting feature of the past two months was the compliance of Oklahoma with its federal production quotas, influenced, however, more by the great declines in oil well potentials suffered in Oklahoma City pool than any other factor, though Corporation Commission and the major oil companies still deserve all credit for successful curtailment of new oil pools, including Lucien, Crescent, South Burbank, and lately Fitts.

*U. S. Dollar at 41 percent discount.

Total stocks of all oils decreased by 3,614,000 bbl. during August, 1934, to a total of 589,719,000 bbl. indicating a daily gross decline in stocks of 116,700 bbl.

The crude oil runs to stills during September, 1934, averaged around 2,385,000 bbl. per day, 200,000 bbl. per day under August runs, thus suggesting that a real effort is being made to control gasoline production.

Low Prices Benefit Demand

INDICATED domestic demand for motor fuel during August, 1934, averaged 1,256,000 bbl. per day, an increase of 3.29 percent above the daily average during July, 1934, when 1,216,000 bbl. per day were consumed; 49,000 bbl. per day above the domestic motor fuel consumption in August of 1933, an increase of 4.06 percent; 96,000 bbl. per day above the domestic motor fuel consumption in August of 1932, an appreciable increase of 8.28 percent; but still 90,000 bbl. per day below the domestic motor fuel consumption in August of 1931, the peak year and also the peak month, a decline of 6.69 percent. The domestic motor fuel consumption up till August 31, 1934, thus continued to exceed the domestic demand in the corresponding months of 1933 and 1932, while currently during September and October, 1934, it is expected the domestic consumption will possibly even exceed the 1931 peak year demand under the influence of drastic price cuts throughout the United States which have noticeably stimulated sales. The break in motor fuel prices in September and in October took prices down from 20 cents a gallon to as little as 8 and 9 cents a gallon, all taxes of from 4 to 5 cents a gallon included, not only in the west, but also on the Atlantic seaboard.

The NEW YORK TIMES weekly combined business index remained between 72.0 and 75.0 during September, or at the low level of the Roosevelt Administration. The index stood at 79.0 on October 1, 1933; at 68.0 on October 1, 1932; and at 79.0 on October 1, 1931. The business activity in the United States continued to be affected by the unfavorable factors suggested in the preceding issue of WORLD PETROLEUM, even though the textile strike was

Effect of Federal Proration Orders in Principal Producing States

	Sept. 1933 to Sept. 1934 Cumulative Overproduction Bbl.	Sept. 1934 Overproduction Bbl.	October 1934 Federal Daily Quota Bbl.	Daily Average Production for week ending October 6 Bbl.	Daily Average Production for week ending October 13 Bbl.
Texas	28,657,000	4,157,000	956,100	1,110,500	
Oklahoma	10,508,000	*	457,400	421,000	
California	5,731,000	550,000	452,300	450,000	
Kansas	2,071,000	96,000	123,700	120,000	
United States	50,303,000	5,607,000	2,325,800	2,468,000	2,549,000

* Oklahoma underproduced 29,000 bbl. during September.

settled with unexpected rapidity. While the oil industry may show large gallonage in the coming months due almost entirely to absurdly low prices of motor fuel, quite apparently there cannot and will not be any profits for the oil companies.

The daily rate of exports of motor fuel averaged 70,000 bbl. in August, 1934, 27.28 percent above the exports in the preceding month; 11.10 percent under the motor fuel exports in August of 1933; 8.56 percent under the exports in August of 1932; and 48.55 percent under the exports in August of 1931.

Total daily demand for motor fuel in August, 1934, therefore, was 1,326,000 bbl., an increase of 4.41 percent as compared with the total daily demand in August of 1933; 7.28 percent above total daily demand in August of 1932; but 10.52 percent under total demand in August of 1931, the year in which motor fuel demand was at its peak.

On September 1, 1934, motor fuel stocks at refineries, plants, terminals and in transit amounted to 54,342,000 bbl., a decline of 2,978,000 bbl. as compared with stocks on hand on August 1, 1934, indicating that during August motor fuel demand exceeded supply by 96,000 bbl. per day.

Motor Fuel Leads Price Break

WHILE gasoline price wars gained momentum slowly during August and September, early in October wide open breaks took place throughout the United States, only the Pacific Coast maintaining a semblance of orderly marketing. The motor fuel price break originated in the East Texas field, where around 150,000 bbl. of "hot" crude oil was brought to the surface each day producing some 50,000 bbl. of cheap gasoline. By October 4 gasoline at East Texas refineries sold down to 7 cents a gallon for truck shipments, this price including 5 cents in state and federal taxes; in Dallas and in East Texas area gasoline at filling stations was cut to 8 and 9 cents a gallon, also including all taxes. Simultaneously price "wars" gaining momentum were responsible for 1-cent per gallon cut in Chicago, to 15.8 cents a gallon for regular grade and including 4 cents in taxes, and to 15.4 cents a gallon for regular grade in parts of Louisiana; the Chicago reduction of major companies having been subsequently met by independents cutting service station prices as much as 2 cents a gallon under majors. By October 10 price reductions reached eastern states and on that date Standard Oil Company of New Jersey and its subsidiary the Standard Oil Company of Louisiana reduced service station and tank-wagon prices of motor fuel 2 cents a gallon throughout their territories, also reducing tank-car prices 1 cent a gallon. In parts of New Jersey where price "war" became most acute further reductions took place bringing the price at service stations to 7.5 cents a gallon by October 18 including 4 cents in taxes, or an all-time low record, and as compared with 17.8 cents a gallon price of but a week previous, a reduction of 74.5 percent if 4-cent taxes are excluded. The price "wars" on the east coast were credited to the desire of major companies to reduce the differential between their brands and the untrademark products from 1½-cents to ½-cent a gallon, though in fact, many independents were selling motor fuel at as high a differential as 2½, 3 and 4 cents a gallon. In Baltimore, Maryland, and Richmond, Virginia, marketing areas four consecutive reductions in five days cut the motor fuel price 5.1 cents per gallon. In the face of complete collapse of retail motor fuel markets the Oil Code and NRA governing bodies remained entirely powerless.

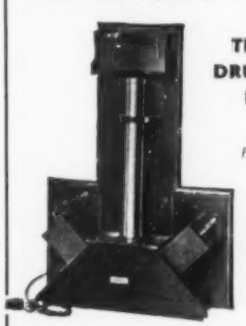
The posted crude oil prices were maintained to this writing, October 17, but in Mid-Continent a reduction of from 25 to 50 cents a barrel appeared due momentarily, unless East Texas field was curtailed promptly by use of military force, if necessary. The crude oil price reduction was undoubtedly delayed by both majors and independents trying to avoid the blame for originating it; though it appears very likely that this time the larger independent refiners, as represented by I. A. O'Shaughnessy of the Globe Oil and Refining Company of Kansas City, will be forced to act first.

Tank-wagon/service station motor fuel prices per gallon, regular grade and including all taxes, in representative districts in the middle of October were: 14.5/15.5 cents in metropolitan New York (8.4 to 13.4 cents in Newark, N. J.); 12.0/13.0 cents in Boston, Mass.; 11.0/11.5 cents in Providence, R. I.; 13.3/13.3 cents in Chicago; 15.5/17.5 cents in Ohio; 16.5/18.5 and 15.5/17.5 cents in San Francisco and Los Angeles respectively; 15.0/17.0 cents in Oklahoma; 13.7/14.7 cents in St. Louis (10.4 in East St. Louis for third grade product); and 24.0/27.0 cents in Montreal, Canada; all with a 2-cent differential for the premium grade.

Refinery gasoline quotations in the Mid-Continent district declined sharply in sympathy with retail prices. Refinery gasoline was quoted on October 15 in a very indefinite market at 2¼ to 3 cents per gallon for 58–60 U.S.M. grade 62.9 and below octane rating in Group 3, Oklahoma market; and 63.0 to 70.9

(Continued on page 440)

The Lovibond Tintometer



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octane rating, U.S.M. brought 3½ to 4 cents per gallon; in East Texas district the third grade gasoline sold down to as low as 1¾ cents a gallon, with 2-cent price prevailing. On the East Coast, at Bayonne, U.S.M. grade 60.0 to 64.9 octane rating was quoted at 5–5¼ cents per gallon (2.95 cents gold*). Gulf Coast prices for export on October 15 weakened to 3¾ cents per gallon (2.21 cents gold*) for 58–60 U.S.M. grade.

Natural gasoline quotations remained fairly steady due to seasonal demand and on October 15 grade 26–70 was quoted at 3.0 cents a gallon (1.77 cents gold*) in Oklahoma and North Texas, and at 3⅜ cents a gallon (1.99 cents gold*) in North Louisiana.

Kerosene prices weakened slightly during the past month and on October 15 grade 41–43 w.w. was quoted at 3–3⅛ cents a gallon in Group 3, Oklahoma market; and at 5–5¼ cents a gallon (3.03 cents gold *) on the East Coast at Bayonne. Gulf Coast prices for export declined to 3¾ cents a gallon (2.21 cents gold *) for 41–43 p.w. grade.

On October 2 the Standard Oil Company of New Jersey reduced bunker fuel oil prices at Atlantic and Gulf Coast ports 15 cents a barrel, bringing prices down to $1.15 a barrel for C grade and to $1.25 a barrel for B grade. Diesel fuel oil was also reduced in price to $1.89 cents a barrel at Atlantic ports, a cut of 6 cents; to $1.70 a barrel at Gulf Coast ports, a cut of 10 cents; and to $1.00 a barrel at Tampico and Vera Cruz, a cut of 5 cents.

Houston County—Southeast Texas

EMPHASIZING the increasing difficulty of discovering even mediocre oil fields the recent discovery in southern part of Houston County, named Kittrell field, reviewed in the preceding issues of WORLD PETROLEUM, apparently joined the ranks of Tomball, Long Lake and Cayuga in being a great disappointment to oil companies and operators interested in the new pool.

The discovery well, Boone Brothers' No. 1 Trinity State Bank in C. McEllis Survey, settled down to around 500 bbl. of 23.4 gravity crude oil and 5½ percent emulsion and fresh water per day from a sand in the upper Carrizo formation at 2,029–2,036 ft. and produced 12,140 bbl. to October 7. Since the discovery 15 new locations were made, of which 10 started actual drilling. Only one additional producer was completed, Humble Oil and Refining Company's (S.O.N.J.) No. 1 E. T. Shaw, the northwest offset to discovery, which was brought in for around 700 bbl. per day through ½-inch choke from 2,066–2,077 ft., correlating 35 ft. lower than the first oil producer and apparently limiting the field in that direction. Five dry holes were completed near the discovery well during the past month, limiting the field in every direction. Failures were completed by the Humble Oil and Refining Company and by independent operators as follows: 330 ft. due north of discovery; 660 ft. due northeast of discovery; ½-mile due northeast of discovery; 1 mile due southwest of discovery and 2½ miles due southeast of discovery. A rare and interesting feature of the Kittrell field is that the producing sand carries fresh water, instead of the salt water which usually accompanies oil accumulations.

*U. S. Dollar at 41 percent discount.

Oklahoma

THE FITTS pool, in southeastern Pontotoc County, continued to attract most attention in the Mid-Continent. During the past month 3 large Simpson oil wells were completed: Carter Oil Company's (S.O.N.J.) No. 1 Craddock in section 25-T2N-R6E (see special map published on page 399 of October, 1934, issue of WORLD PETROLEUM) was brought in for around 8,000 bbl. initially in Simpson formation with a total depth of 4,427 ft.; Blackstock Oil Company No. 2 H. Harden in section 30-T2N-R7E flowed at the rate of 10,000 bbl. initially through casing with a total depth of 4,535 ft. and J. E. Crosby No. 3 D. Harden, in the same section, was completed with a total depth of 4,270 ft. flowing at the rate of 15,000 bbl. per day through two 4-inch lines and at the rate of 6,000 bbl. per day through one 2-inch choke. New completions thus brought the potential production of Fitts field to around 30,000 bbl. per day from 6 wells.

Two failures were completed in Fitts along its northern end, both drilled by Magnolia Petroleum Company (Socony-Vacuum), suggesting a narrow and highly faulted structure, though the field will in all probability extend for some distance due east, unless limited by faulting. In any case even present completions definitely indicate the presence of a major field.

J. Lynch and others No. 1. A. Thompson in section 1-T1N-R7E, a wildcat test of great importance 3 miles due east from Fitts pool and located on a well defined surface structure, was delayed by a fishing job at 3,780 ft. where it was correlating very satisfactorily and was given a good chance to produce.

Standard Oil Company of New Jersey through its Oklahoma subsidiary, the Carter Oil Company, continued to pursue its policy of acquiring important crude oil reserves by purchasing 540 acres, all practically proven, in Fitts pool for a reported consideration of $5,200,000, of which $1,000,000 was in cash and balance in 3 percent bonds due over a period of 25 years. The sellers were three independent operators, W. A. Delaney, B. C. King and S. S. Miller, all of Oklahoma. It is interesting to note that the purchased acreage, if all producing, will have to average 9,600 bbl. per acre on $1.00 crude market before the original cost to Carter Oil Company is covered, not including development and operating expenses. It will be a few years before such recovery will be attained under proration, but the purchase is undoubtedly a very logical step in a sound policy of assembling what is possible of the diminishing crude oil reserves of United States. Standard Oil Company of New Jersey in the last few years has acquired extensive producing properties in the Conroe field, Texas, and in the Oklahoma City field.

The semi-annual potential tests in Oklahoma City field remained uncompleted after the Supreme Court of Oklahoma on application of the Indian Territory Illuminating Oil Company and others suspended the orders of the

Corporation Commission on taking potentials in the Wilcox sand zone. The Court ordered the October Wilcox sand wells allowables to be based on old potentials, permitting a 5.8 percent production. The issue was the option offered producers by the Corporation Commission to take a flat 50 percent decline for establishing new potential, in lieu of actual four-hour flow tests. The objection to this order was that operators would choose a 50 percent flat decline to flow tests if they knew that their wells could not make at this time 50 percent of their old potential, and that therefore the order was favoring wells with rapid declines and was discriminating against good wells. The potential tests on Wilcox sand wells tested prior to the Court order indicated a 26.32 percent decline in potentials, as compared with tests made six months ago, of 145 wells which took four-hour tests, while 222 wells took a voluntary 50 percent flat decline, bringing the net decline of 367 wells to 40.24 percent under old system of calculating potentials. It is anticipated that the Supreme Court will rule in favor of actually testing all wells.

Cooper—Jal, New Mexico

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Present developments indicate that the Cooper and the Jal pools, now 4 miles apart, are parts of one field perhaps separated by a saddle with smaller wells, in which case southeastern New Mexico will have two major pools—the Cooper-Jal and the old Hobbs, 30 miles due north. Acid treatment will add greatly to flush production and reserves of New Mexico's limestone pools, as in the past year some very small wells in Hobbs and other fields have been turned into large flowing wells by acid application.

It is not anticipated that the Cooper-Jal field will offer any difficulties for its proration because practically all the leases are owned in large tracts by major oil companies. Phillips Petroleum Company with 720 acres in one block centrally located in Cooper field is the largest single owner and will profit greatly from its conservative and economical development.

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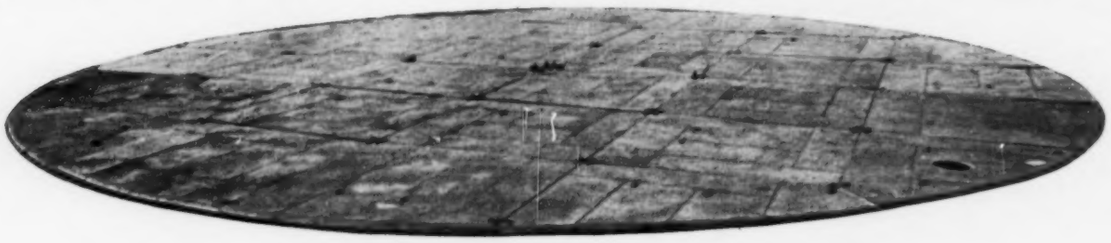

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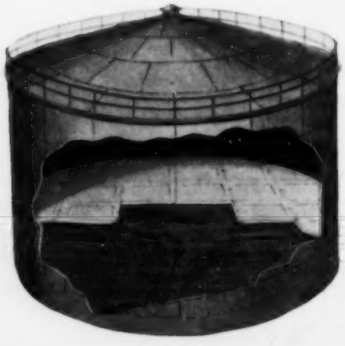

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Gt. BRITAIN
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rights of the state therefore recognized by the Constitution and by our highest court will be entirely destroyed. . . ." It is considered highly improbable that the government will appeal the case.

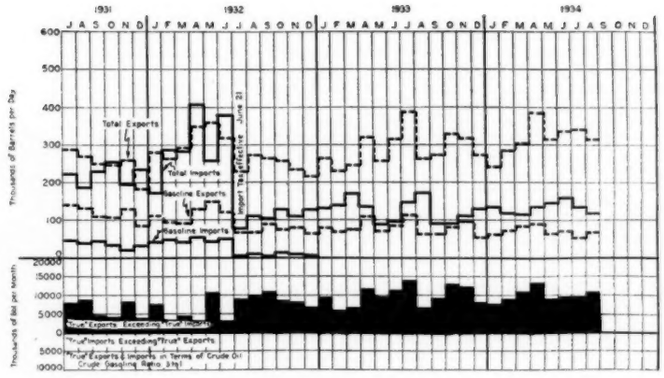
Another amazing development occurred late in September when James Crawford Biggs, Solicitor General in Washington, requested the United States Supreme Court to dismiss the government's case against J. W. Smith and four other Texas operators charged with overproduction on the ground that President Roosevelt's executive order on oil production, as signed, omitted by oversight the mention of the offense charged. The omission referred to is the last paragraph of Section 4, Article III, reading: "If any subdivision into quotas of production allocated to any state shall be made with a state, any production by any person, as person is defined in Article I, Section 3, of this Code, in excess of any such quota assigned to him shall be deemed an unfair trade practice and in violation of this Code." President Roosevelt corrected the mistake on September 25 and federal agents were reported to be active again in the East Texas field gathering information on violations of production quotas since that date.

On October 9 officials of the Oil Administration and of the Department of Justice secured from the United States District Judge P. Forman in Trenton, N. J., temporary orders restraining action on two cargoes of gasoline brought by SS. PHOENIX to Bayonne and by SS. PUEBLO to Carteret, N. J., though both tankers were permitted to unload, but the gasoline was to remain sealed. The Petroleum Administrator's office claimed that both tankers brought gasoline which appeared to have been made from illegal crude oil. On October 17, however, Judge Forman handed down an opinion denying the petition of United States Attorney for a permanent injunction against the entry of the two shipments, and granted the motions of the defendants for dissolution of the temporary restraining orders.

The United States Supreme Court agreed to review lower court decision on the constitutionality of the oil production control provisions of the NIRA, as challenged by Amazon Petroleum Corporation and the Panama Refining Company, both operating in the East Texas field, where the United States District Court ruled against the government but which decision was subsequently reversed by the Fifth Circuit Court of Appeals in New Orleans. The Amazon Panama case assails the constitutionality of Section 9-C of the NIRA and the Oil Code, and the oversight previously referred to does not affect this case in any manner.

By the middle of October it appeared most probable that Secretary Ickes would abandon attempts to control production, leaving that problem to the state agencies, and will concentrate on curbing shipments of illegally produced crude oil in the interstate commerce. Also a concerted effort will be made to revive and pass an Oil Control Bill in the next Congress. An active campaign is, however, now under way against any new federal oil legislation, and the candidates for governors in Texas, California and Oklahoma expressed themselves definitely for state control measures.

Total U. S. imports and exports and gasoline imports and exports in relation to true exports exceeding true imports.


1931
1932
1933
1934
J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
Thousands of Barrels per Day
Total Exports
Total Imports
Gasoline Exports
Gasoline Imports
Effective June 23
Thousands of bbl. per Month
"True" Exports Exceeding "True" Imports
"True" Imports Exceeding "True" Exports
Total Exports & Imports in Terms of Crude Oil
Crude Gasoline Ratio 3 to 1

Gasoline Purchase Plans

THE GASOLINE purchase plan of "distress" gasoline approved on September 10 by Secretary Ickes collapsed entirely when the East Texas illegal crude oil production increased to over 120,000 bbl. per day. While the industry was apparently willing to absorb up to 60,000 bbl. of "hot" oil per day, or about 20,000 bbl. of gasoline, it was found impossible to combat the influence of 120,000 bbl. of cheap crude oil which flooded the markets with 40,000 bbl., 1,680,000 gallons, of gasoline per day.

Vertical Unionism Adopted by A.F.L.

THE American Federation of Labor at its Convention in San Francisco voted on October 11 definitely to change its structure and policies, deciding that mass production industries shall be organized along industrial or vertical lines rather than on craft or horizontal lines. Automobile, cement and aluminum industries were to be affected first, and probably the change will eventually apply to the oil industry. The change in this basic policy will greatly strengthen the union cause within industries.

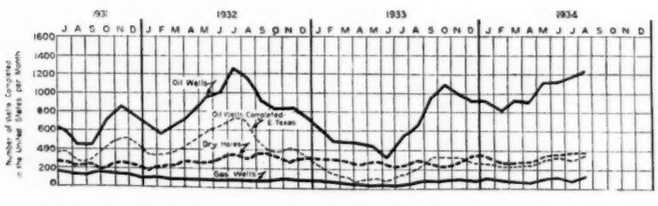
Imports and Exports

DURING August, 1934, total imports of all petroleum products into the United States further declined to 3,561,000 bbl., 115,000 bbl. per day, as compared with 4,101,000 bbl., 132,250 bbl. per day, imported during the preceding month, and 4,712,000 bbl., 157,100 bbl. per day brought in, in June, 1934.

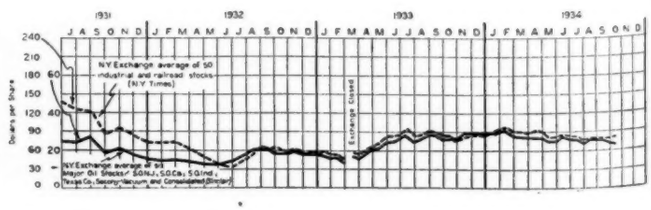
It has been brought to our attention that total import figures as given in WORLD PETROLEUM were not entirely clear to some of our readers in their relationship to federal import quotas inasmuch as bonded and non-dutiable imports were not separated. In fact, under the federal quota the imports are limited to 108,400 bbl. per day, and while total apparent imports during August, 1934, exceeded the quota by 6,600 bbl. per day, the "true" imports, excluding bonded non-dutiable imports for refining and export or for supply of vessels, averaged 20,700 bbl. under allowable, 451,695 bbl. of crude oil and 971,387 bbl. of refined products having been brought into United States in transit. Similarly while total imports into United States in the September, 1933–August, 1934 restricted one-year period, inclusive, averaged 123,800 bbl. per day, thus apparently exceeding the quota by 15,400 bbl. per day and by 5,620,000 bbl. over the whole year, "true" imports, as defined above, averaged 102,200 bbl. per day over the past year, therefore being 6,200 bbl. per day and 2,263,000 bbl. for the restricted period under the federal quota. The reports of the Department of Commerce indicate that 1,650,961 bbl. of crude oil and 6,240,657 bbl. of refined products entered United States during the past year in bond.

(Continued on page 438)

U. S. drilling; comparison of oil wells, dry holes, and gas wells.


1931
1932
1933
1934
J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
Number of Wells Completed in the United States per Month
Oil Wells
Oil Wells Completed in Texas
Dry Holes
Gas Wells

Six major oil stocks in relation to 50 industrial stocks on the New York Stock Exchange.


1931
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J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
Dollars per Share
N.Y. Exchange average of 50 industrial and railroad stocks (N.Y. Times)
Exchange Closed

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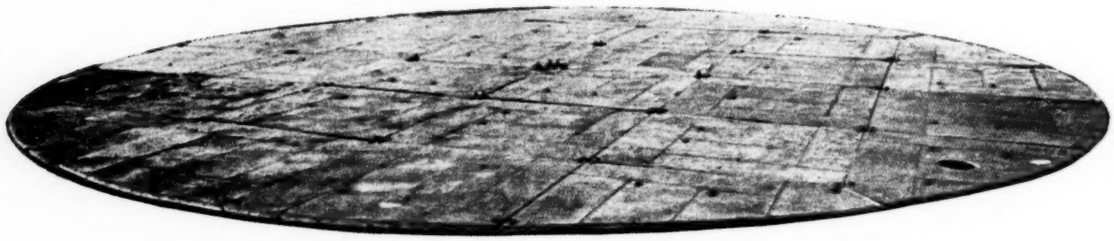

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